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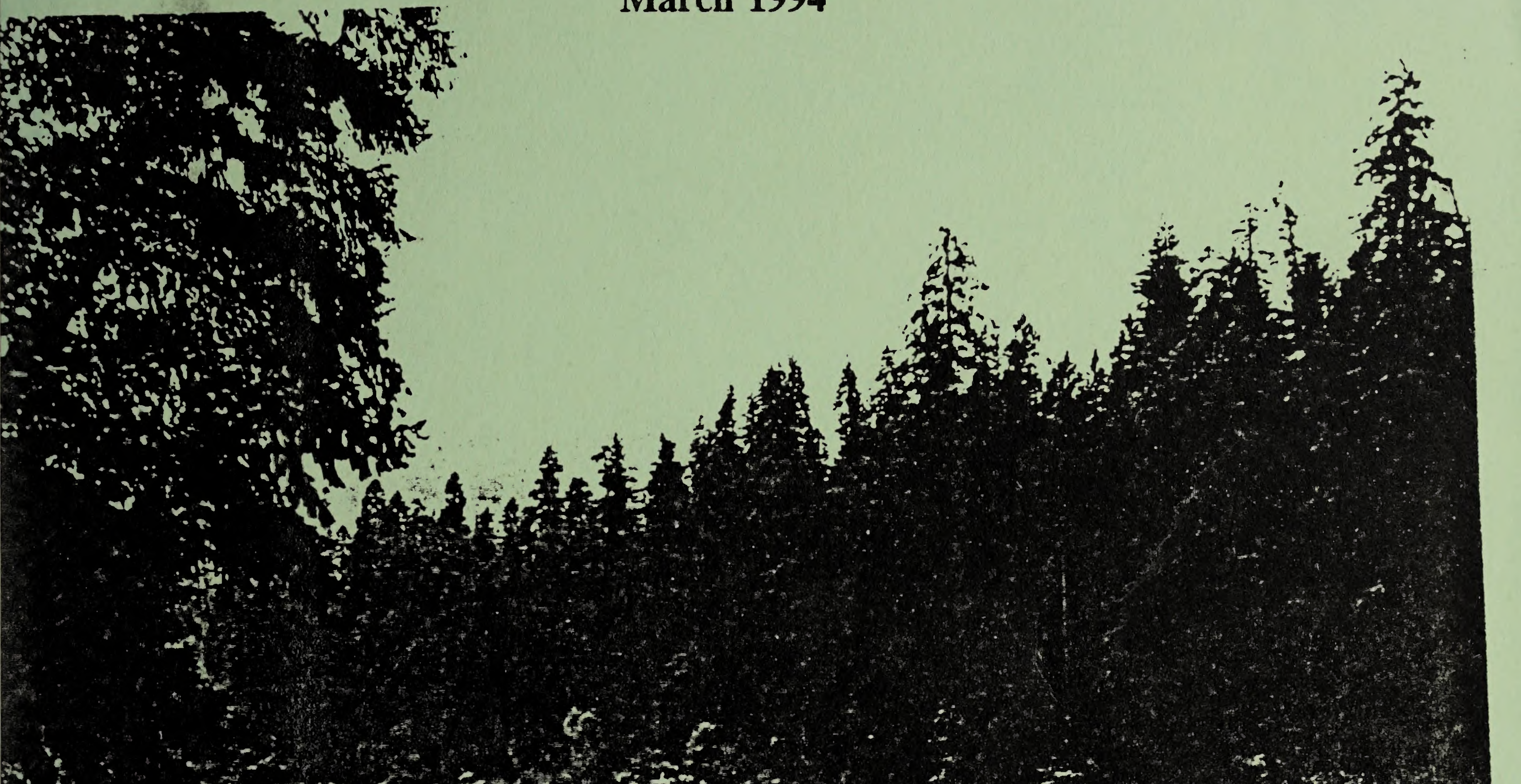
LANDSCAPE-LEVEL WATERSHED ANALYSIS

An Experience Report from BLM Districts in Western Oregon

March 1994



Prepared by Robert Alverts
Oregon State Office

Volume 1

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LANDSCAPE-LEVEL WATERSHED ANALYSIS

An Experience Report from BLM Districts in Western Oregon

March 1994

Prepared by Robert Alverts
Oregon State Office

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INTRODUCTION/BACKGROUND

Because watersheds are the foundation for implementing ecosystem management, in the spring of 1993 the Bureau of Land Management (BLM) began the complex process of developing standards and initial procedural criteria for conducting landscape-level watershed analysis on those districts involved with implementing the President's Forest Plan for the Pacific Northwest. Watershed analysis is a tool aimed at helping understand and document the components, processes, functions, and interactions that occur in a specific geographic area. One of the goals is to promote the sustainability of watersheds by protecting the processes and functions that occur within and across different spatial and temporal components.

To accomplish this task, an interdisciplinary team of State and District office specialists was established. This group met several times in the spring of 1993, reviewing the work others had done in this area, including the U.S. Forest Service, to help ensure compatibility between the agencies. An interim landscape-level watershed analysis process was completed by June 1993. Direction was sent out to the field units in June through Information Bulletin No. OR-93-478; and additional supplemental guidance was distributed in August via Information Bulletin No. OR-93-605 and in November by Information Bulletins Nos. OR-94-081 and OR-94-106 (see Appendix A). It is important to note that BLM's process matches up with the eight steps of watershed analysis, listed on page 10 of the Federal Agency Guide to Watershed Analysis.

Several steps detailed in the guidance documents are important to understand. These include:

1) Delineating geographic landscape-level watershed analysis units.
2) Setting priorities for initial landscape-level watershed analysis activities.
3) Identifying major issues, objectives, and content elements for areas selected for landscape-level watershed analysis.
4) Collecting, organizing, and developing relevant information and products to describe the landscape analysis unit (LAU).
5) Assessing, interpreting, and reporting on the information to address the issues and objectives for the LAU.

The Districts have been working on watershed analysis since the summer of 1993. This report summarizes BLM District activity to date in response to the guidance that has been distributed. As the report will document, watershed analysis is a complex process that requires a solid understanding of physical and biological resource elements and related cultural information involving all landowners in a subbasin. It is an iterative and evolutionary process that requires a high degree of expertise that is further complicated in BLM's case by the checkerboard ownership pattern which predominates the western Oregon land base. Because of the complexities involved and the evolutionary nature of this workload, it is also apparent that watershed analysis is and will be a time-consuming process, where initially there are often more questions than answers.

WHAT WE HAVE LEARNED SO FAR

Setting Objectives/Developing Key Questions

As a first step in the watershed analysis process, a listing of key issues and questions important to specific subwatersheds helps focus the kinds of information that needs to be compiled and/or generated. This information can be generally grouped into the following categories: landscape elements (including functions, processes, and flows), landscape conditions, and relationships between elements and conditions (including both resource and social). The key is to let the relevant issues drive the analysis.

Some examples of key issues and questions are listed below:

1) How should watershed areas be defined and delineated for analysis?

2) What are the important landscape-level watershed elements (including biological and physical functions, processes, flows, and conditions) and the relationships between these elements and human activity/cultural development in a watershed area needed to assess watershed health and condition. (See matrix of elements and flows prepared by the Glendale Resource Area, Medford District, in Appendix C).

3) What information is currently available? What is missing but needed?

4) How should information be organized and coordinated?

5) What products should be produced in the watershed analysis process?

6) How should diverse information and data sets between various landowners and interests be coordinated?

7) How should public involvement be factored into the watershed analysis process?

8) Where is watershed analysis required?

Delineating Units for Landscape-Level Watershed Analysis

A next step involved delineating units through a nested hierarchy of geographic landscape areas as shown in Table 1.

TABLE 1
Hierarchy of Geographic Landscape Areas

- Water Resource Regions and Subregions (USGS)
  - Hydrologic Unit (USGS)
    - Analytical Watershed (RMP)
      - Landscape Analysis Unit
        - Subwatershed
          - Stand-OI Unit (Ecological Site)

Note: These geographic landscape units are "nested" (i.e., aggregations of subunits perfectly match the larger unit boundaries) and interact with each other (i.e., they cannot be analyzed in isolation from one another).

Definitions for these terms are listed in Appendix B.

The criteria for delineating LAUs were also developed. Landscape analysis units were to:

1) Be based on natural features.

2) Generally be aggregates of subwatersheds (i.e., they can be no smaller than their subwatershed and no larger than their analytical watershed).

3) Usually ignore property and administrative boundaries (as well as land use allocation boundaries in the Resource Management Plans (RMPs)) and incorporate all ownerships.

4) Edge match with adjacent LAUs (e.g., adjacent Resource Areas, Ranger Districts, etc.) to preclude gaps or overlaps.

Setting Priorities for Analysis Areas

The guidance documents instructed Districts to focus their initial efforts on those LAUs where priority activities were planned for FY 1994-95. This included salmon restoration activities, timber sales, silvicultural demonstration projects, and other activities that would not preclude future options.

Organizational Structure and Skills Required

As Districts began to take on this workload, it became clear that interdisciplinary teams were needed to effectively address the complex issues involved. A variety of team structures were developed to meet specific needs in each field office, and a full spectrum of skills have been engaged in watershed analysis work to date.

For example, in the Eugene District each Resource Area has established at least one watershed analysis team composed of multiple specialists and a team leader. They have also set up a working group in the Division of Resources to coordinate information gathering and data conversion, and a working group to address key issues and questions. Similar structures involving the spectrum of resource programs and skills occur in other Districts and Resource Areas. To date, Districts have found some skills not adequately represented at the local level (e.g., social sciences for work on the cultural (human development) elements).

EXISTING INFORMATION AND ADDITIONAL DATA NEEDS

Initial instructions for conducting watershed analyses focused on the use of existing information as primary data sources. To date, the Districts have used both internal and external information sets. Table 2 shows the internal sources which includes a combination of GIS themes, maps, aerial photos, and other data sources of varying ages, some of which are important for historical perspective.

TABLE 2
Existing Information - Internal Sources

Western Oregon Digital Data Base (WODDB) Themes including: Transportation (TRB) Ownership (OWN) Operations Inventory (FOI) Hydrography (HYD) Fish (FSH) Public Land Survey (PLS) Visual Resource Management (VRM) Timber Production Capability Classification (TPC) Sensitive Plants and Animals (PNN) County Zoning (CTZ) Spotted Owl Centers (SOC) Soils Note: *The audit table function has proved valuable for sorting information.*
General Land Office Maps and Field Notes
1916 O&C Revestment Survey Cruise Books from Archives
MICRO*STORMS Data
Aerial Photos of Varying Scales and Ages
Old Forest Management Atlases for Past Cutting History
Analysis of the Management Situation (AMS) and other RMP Information

Table 3 shows the external information sources that have proven useful to date. This includes products from Federal, State, and county agencies and some private sources.

TABLE 3
Existing Information - External Sources

U.S. Geological Survey Quad Maps and Geology Maps
Soil Conservation Service Soil Maps and Reports
National Oceanic and Atmospheric Administration Weather Data
Forest Service Plant Association Handbooks
Forest Service Data on Vegetation Types, Sensitive Botanical Species, Watershed Boundaries, etc.
Oregon Dept. of Environmental Quality Water Quality Status Assessment Reports (1988, 1992)
Oregon Dept. of Fish and Wildlife Stream Habitat Surveys
Oregon Native Plant Society Data Base
Univ. of Oregon and Oregon State University Archive Maps and Photos
1993 Satellite Imagery *Note: In Eugene, image processing software allowed them to internally process/classify entire watersheds using 30 meter imagery, and riparian areas using 10 meter spot satellite imagery in conjunction with the 30 meter imagery.*
Oregon Dept. of Revenue Township Forest Type Maps on Private Forest Land (Scale is 1:12,000. These are good for aging private forests over 20 years old). Cost is $1 per township. Contact is Linda Hawkins at (503)945-8297.
Oregon Dept. of Forestry Fire History Data Base (includes fire frequency and occurrence from 1966-1993)
Oregon Dept. of Forestry Overlays of State Forest Land (Scale is 1:12,000.) Contact is Bonnie Regan at (503)945-7364. *Note: Elliott State Forest is in ARC/INFO.*
Southern Oregon Historical Society Data Base
County Watermaster Data on Streamflow and Water Rights
Private Landowner Information from County Forestry Extension Agents and Timber Companies
Publications on Landscape and Watershed Analysis (e.g., Diaz and Apostle, Journal of Forestry, etc.)
Use of Digital Terrain Models (DTM)

Although instructions focused only on the use of existing information as the basis for initial watershed analysis, the Districts found it necessary to collect some "new" data for the watershed analysis process. This includes combining existing data sets from a variety of formats and converting that information into "new" or combining it with existing GIS themes. To date, the following subject area themes have been developed and/or modified (buffered, merged, intersected, or overlaid):

1) A Private Operations Inventory (POI) theme was developed from aerial photos and scanned into GIS to show vegetation on private land, including attributes for cover type, crown cover, harvest type, birthdate, and presence or absence of residual trees.

2) First and second order streams that were missing from the GIS HYD theme were obtained from aerial photos, then scanned into GIS to update the HYD theme. Limited field checks were also conducted.

3) A Subwatershed theme (SWS) was developed using the criteria for landscape analysis units outlined in Information Bulletin Nos. OR-93-478 and OR-93-605.

4) The Transportation theme (TRB) has been edited to incorporate current private and other roads.

Each of these complex actions required the ingenuity and creativity of District team members, who often took sketchy, disjointed data and converted it into useful information.

We also recognized that variability in the kinds of data being collected and the formats for data organization and display could lead to problems with consistency and differing standards. A group has been organized to begin work on consistency and standardization for the information requirements of watershed analysis. This effort will also involve other agencies, and we expect interagency standards to be developed through interaction with the Interagency Resource Information Coordinating Council (IRICC) group.

Our experience to date also shows there are a number of gaps in our existing information base. Several kinds of additional information/data needs to be gathered on all lands to do a thorough job of watershed analysis. These needs are summarized in Table 4 as follows:

TABLE 4
Additional Information/Data Needs

Overstory vegetation on private land that links to habitat types, including forest, non-forest agriculture, and areas of human development that equate to ecological disturbance areas.
Missing hydrology for all townships, including first and second order drainages, perennial vs. intermittent, etc.
Ownership theme showing all landowners in each subwatershed area/LAU
Subwatershed area/LAU theme that includes: Landscape metrics Patch metrics Edge metrics Core Area metrics Plus such derived values as equivalent clearcut acres, number of stream intersections, roaded miles per unit area, riparian habitat condition ratings by stream order, etc.
Stream channel condition information
Special forest products distribution, abundance, etc.
Missing data outside the WOODB GIS area (e.g., streams, roads, vegetation, topography, soils, etc.)
Private roads information
Riparian habitat conservation area (reserves) theme derived from current hydrography theme
Fish information
Sensitive plants and animals theme
Special habitats theme building on TPC, photos, reviews of field surveys and related data
Desired future condition information
Application of various models (e.g., FRAGSTATS, SNAP II, UTOOLS, etc.)

ANALYTICAL TOOLS AND TECHNIQUES

Applications to Date

As noted earlier in this report, various GIS themes have proved invaluable, once basic questions and objectives were understood. Procedures for developing and using GIS themes have been developed in both MOSS and ARCINFO.

The Salem District has completed the following techniques for developing relevant watershed analysis GIS information:

1) Computer programming language (CPL) instructions for calculating acres by birthdate for the past 20 years. Results used in equivalent clearcut acre determinations (Called Polyanna.cpl, developed by Bruce Ahrent (503)375-7972). This is being modified to be applicable to private forest land in the POI theme.

2) Several Watershed CPL instruction sets have been prepared by Salem employees to create a number of maps from MOSS data. These are listed in Appendix D and include:

    Fish Distribution
    FOI Map
    Land Use Allocations
    Wetlands
    Out Areas/Fragile Areas
    Ten Year Harvest Scenario
    Rural Homesites
    Road Intersections in Riparian Areas

The recently distributed Federal Agency Guide to Watershed Analysis is also expected to be a valuable tool for Districts to use in their activities. As we gain additional experience, we expect to fill in the missing chapters in the guide and make the necessary changes and improvements in the existing sections. As mentioned earlier in this report, it is important to recognize that BLM's process matches up with the eight steps of watershed analysis, listed on page 10 of the Federal Agency Guide to Watershed Analysis.

Because the collective BLM experience to date focuses largely on gathering and structuring information, we have not yet developed an experience base in the various ways of analyzing the information to answer relevant issues and questions.

Needs/Recommendations

Through our experience, several employees have learned about models and other tools and techniques for effective analysis. This includes the following examples which are recommended for testing and application: FRAGSTATS, PRMS, SHADOW, UTOOLS, and SNAP II.

The Ashland Resource Area of the Medford District has tested SNAP II for a small subwatershed known as the Buncom Project. A summary of their experience is included in Appendix E. Additional information can be obtained by contacting Bob Pierle in the Medford District (503-770-2446).

Additional models need to be developed and/or tested for such issues as: vegetative growth rates, over and understory plant associations, terrestrial and aquatic habitat, base and peak streamflow, water temperature, available water, stream channel stability, upslope processes, landscape structure, fire and climate history, etc.

Additional ARCINFO programming skills and pilot examples are needed to convert data such as FOI and POI into the ARCINFO system.

Satellite imagery interpretation techniques should be learned and applied (e.g., low-level infrared and video imagery for riparian zones subject to impact.

A multi-valued field in MICRO*STORMS needs to be developed as a tool for analyzing LAUs and compartment associated acres.

Techniques for combining and synthesizing different data sets from a variety of cooperators should be explored and developed. Included in this are agreements that permit data sharing between public and private interests and entities, hopefully free of legal constraints such as anti-trust laws.

PRODUCTS DEVELOPED TO DATE

The primary products developed to date are maps, most of which are in a GIS, and the supporting resource data found in a variety of sources as noted earlier in this report.

Working maps are particularly valuable products for watershed analysis, whether developed by GIS or other systems. To date, the primary products that have been developed include the GIS themes, plus the other information and data sets mentioned above.

In addition, a first generation Draft Watershed Analysis has been completed for two LAUs (Galesville and Rogue Frontal West) in the Glendale Resource Area of the Medford District. These are attached as Appendix F.

The Glendale Resource Area, Medford District, has also developed a preliminary process for linking proposed actions to the watershed analysis process, NEPA requirements, and other necessary reviews and approval steps (see Appendix G). This example helps demonstrate the application and utility of landscape-level watershed analysis.

As the Districts complete analysis on additional areas and couple these activities with the work done on the Pilot Watersheds, we should be able to learn from our experiences, avoid making the same mistakes, and pass on the good examples for others to build on.

INTERAGENCY COORDINATION

The Districts have done an excellent job of interacting with adjoining National Forests to match subwatershed boundaries and to begin sharing information and identifying common data needs. One example is noted in Information Bulletin No. OR-94-081, found in Appendix A, where the Eugene and Salem Districts developed some joint criteria for watershed analysis with the Siuslaw and Willamette National Forests. Another example is a jointly developed interagency preparation plan for the Nestucca Basin Watershed Analysis (one of the pilot analyses) prepared by the Salem District and other agency cooperators (see Appendix H). This plan is a working document that will be changed as the process evolves.

Districts have also worked with other Federal, State, and county agencies, as well as private landowners to acquire relevant information for watershed analysis and to involve other owners in the process. These contacts are essential to acquiring and sharing information of mutual interest. Because some of the information is not directly compatible from one agency to another, additional time is often required to make the data useful. As noted earlier in this report, there are also difficulties with obtaining private forest information from private landowners, including major timber companies who have extensive intermingled holdings with BLM throughout western Oregon. It may be necessary for BLM and the Forest Service to develop or amend written agreements with these companies before much detailed information will be shared.

THE HUMAN DIMENSION IN WATERSHED ANALYSIS

While everyone recognizes the need for incorporating the human dimension into landscape/watershed analysis, resource agencies including BLM are not as well prepared to address these concerns as they are with other aspects of watershed analysis.

The concept of the human dimension accepts a definition of the ecosystem which sees humans as a part. Understanding the human dimension means analyzing the interplay between humans and the environment, past and present. This analysis consists of defining the effects humans have had on the development of local ecosystems through time, as well as the effects of this dynamic on local cultural patterns (e.g., settlement systems, community structure). The human dimension incorporates present policies and land use practices, and hence includes a wide range of policy concerns today.

There are two main parts to addressing the human dimension in watershed analysis: 1) Historical ecology: the practical understanding of past and current relationships among biological and physical systems and human groups; 2) Public participation: developing the dialogue and social assessments necessary to formulate and implement appropriate land management practices. The material in Appendix I is meant to assist field units as they address the human aspects in their current watershed analysis efforts.

In addition to working with other agencies and landowners in watershed areas, the Districts have begun public involvement activities. Included in these are District newsletters from the Salem and Eugene Districts (see Appendix I). These newsletters describe the watershed analysis process as part of ecosystem management, and identify the primary watershed areas in which work is being done. They also identify opportunities for our interested publics to get involved in the watershed analysis process. To date, the newsletters, although well written and widely distributed, have not prompted much public interest. We need to recognize the kind of cooperation and information we are seeking will take time. Some people will not be interested, while others will be critical regardless of what we do. As we work to involve the public in this process, we need to keep expectations realistic.

A complete interagency public participation plan has been drafted for the Nestucca River Watershed, one of the Pilot Watersheds. More information can be obtained from Chuck Hawkins (503)842-7546.

SUMMARY - WHERE DO WE GO FROM HERE?

Most activities to date have focused on the collection and organization of various information sets. Our experience has indicated that available data comes in a broad variety of forms, sources, levels of detail, time periods, and quality. We have learned that data collection alone is a time-consuming, complex process.

Because much of the analytical work (the evaluation and interpretation of existing data) remains to be done, it is too early to know what additional issues and problems will be encountered. What is clear is that this kind of work is complex and requires the skills and time of a lot of people within and outside government, a number of whom we have not traditionally dealt with.

Although our efforts to date are not all coordinated or cohesive, that is the nature of pioneering work. Some work groups venture out and try new things, while others lay back and wait for clear direction. Through our experience, we have developed information and products from which we can learn and build. Part of our learning also includes the recognition that we have improved our understanding of this complex workload. We are recognizing the need to come together to blend diverse information into common data sets, and to develop standards, while also continuing to encourage our employees to exercise their creativity and ingenuity.

So, we are moving ahead, interacting with one another, and sharing both our experiences (things that work and things that don't) and information so that we can continue to work effectively and learn from our efforts. There is no singular example of "correct" watershed analysis. Instead, there are multiple pathways that can and should continue to be pursued through our activities and those of the Pilot Watershed groups.

One area where we need help is from key agency officials and politicians. In their discussions and public presentations, they need to keep expectations about watershed analysis realistic. Watershed analysis is and will be an evolutionary process. Perfection will not occur at the outset, and we need to learn to live with and be proud of the products that are developed as we evolve through this process. At the same time, we cannot shortcut the requirements only to find ourselves back in the arena of appeals and litigation.

APPENDIX A

BLM Landscape-level Watershed Analysis Guidance Documents

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Oregon State Office
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Portland, Oregon 97208

"ALL BRANCH & STAFF CHIEFS"

IN REPLY REFER TO:
1736 (933/931)

June 16, 1993

Information Bulletin No. OR-93-478

To: DMs, Salem, Eugene, Roseburg, Medford, Coos Bay and Lakeview
DSDs, Staff and Branch Chiefs

From: State Director

Subject: Initiation of Landscape Analysis Process in Support of Ecosystem-Based Management in Western Oregon RMPs

The BLM is committed to ecosystem-based management as outlined in Information Bulletin No. OR-93-339 and in the March 25, 1993, partnership memorandum with USDA, Forest Service. Given the concepts of our new management direction and the foundation established in the draft RMPs, a landscape level analysis is an essential tool to help implement ecosystem-based management.

The Western Oregon Landscape Analysis Study Team, comprised of representatives from westside districts and State Office divisions (see Attachment 1), was established to develop both an interim and a long-term RMP implementation strategy. This Information Bulletin conveys the interim guidance and provides background information for initiating the landscape-level analysis process in Western Oregon. Through landscape analysis, RMP objectives and existing landscape patterns and resource conditions are translated into definable management goals and objectives for each particular landscape. Specific details of the process are outlined in Attachment 2. A sample landscape analysis document is being developed and will be distributed under separate cover.

We believe these initial steps will be fundamental to ecosystem-based management (ESBM) regardless of changes to the RMP, new legislation, the outcome of the Forest Conference, or other proposals. We recognize that direction emanating from the Forest Ecosystem Management Assessment Working Group (the post-Forest Conference group) may cause us to modify some of the following landscape analysis procedures; however, familiarity with the concepts, using the overall process, and collecting much of the information should expedite our implementation of any changes. We also recognize that this effort comes at a very busy and chaotic time, but believe the process will provide valuable end products for FY94 and beyond (e.g., base data and a foundation for analyzing projects and activities). This workload needs to be a high priority. Few RMP implementation actions are expected to occur until some level of landscape analysis is conducted.

You are to initiate your landscape analysis efforts in accordance with workload priorities identified in the FY93 mid-year review feedback (IM No. OR-93-129). Your efforts should focus initially on those landscape analysis units (described below) where FY94 activities are planned, followed by units involving FY95 activities and other remaining areas. Plan to complete your initial landscape analysis work not later than mid-year FY94 for those landscape units where FY94-95 activities are planned.

It is important to recognize the tie to another proposed priority workload, the identification of Transportation Management Objectives, as recently transmitted by I.B. No. OR-93-409. As noted in Attachment 2, Step 3, this information will be of value to the landscape analysis process.

The process outlined in Attachment 2 involves analyzing landscapes in a hierarchical fashion, such that information can be aggregated or subdivided to fit a variety of needs at different scales. It requires the establishment and delineation of landscape units, built on watershed areas, for analysis purposes. These units are tiered from USGS Hydrologic Units and analytical watersheds (see hierarchy in Attachment 3). Although various hierarchies could be logically supported under an ESBM approach, it is important that a consistent hierarchy be used across ownerships to facilitate data aggregation for appropriate scales of analysis of our respective programs. This process reflects existing Forest Service direction and our current efforts to develop a consistent approach with them.

We expect the process to be dynamic, generating many questions for which there are no easy or quick answers. Some GIS themes and procedures may need to be updated; however, due to current workload conflicts, your initial efforts should utilize existing information. As with adaptive management, revisions to the process may occur with increased experience, overriding procedural direction (e.g., post-Forest Conference) and scientific advances in understanding ecosystems.

Efforts are already underway in several districts to map sub-watersheds and landscape analysis units. This process is an attempt to build upon these trial efforts to provide consistent guidance, as well as the basic building blocks for ESBM. The end product of this interim process will be an analytical tool (customized to your specific geography, resources and issues) that you will use to ensure that forest ecosystem management actions and other proposed activities are designed and conducted from a landscape perspective.

Continuing Study Team Actions & Time Frames

The Western Oregon Landscape Analysis Study Team will continue to meet periodically to:

1. draft new prototype memoranda or handbooks regarding long-term ecosystem management and RMP implementation using a landscape analysis process;
2. facilitate dissemination of example analyses from BLM and other agencies;
3. review preliminary landscape analysis products to ensure at least minimum consistency;
4. recommend linkages between landscape analysis and environmental analysis (NEPA);

5. coordinate BLM methods with other agencies to foster cooperation and consistency;
6. recommend or facilitate staff training and workshops on landscape analysis; and
7. identify data/technology needs and gaps on an ongoing basis based on current field experiences.

By Fall 1993, the study team plans to:

- develop a sample landscape analysis document to assist teams in their initial work;
- develop an outline for a draft handbook or manual to further guide landscape analysis;
- identify NEPA compliance steps (likely recommending another_workgroup to develop guidance);
- develop a prototype section for PRMP/FEISs on how landscape analysis will be used in the long term to implement the RMPs and provide a basis for monitoring; and
- suggest appropriate public involvement formats and opportunities, to include affected landowners and regulatory bodies, at designated steps in the landscape analysis process.

If you have any questions or comments about this guidance, please contact Bob Alverts or Jerry Magee in the State Office (503-280-7357 and 280-7086, respectively) or your district or other representatives on the study team (see Attachment 1). If requested, on-site workshops can be developed to assist in initiating landscape-level analysis in your district.

D. DEAN BIBLES

State Director

3 Attachments
1 - Western Oregon Landscape Analysis Study Team - 1p.
2 - Western Oregon Landscape Analysis Format – Interim Process - 3pp.
3 - Hierarchy of Geographic Landscape Areas and Definitions - 1p.

Distribution
WO-200 (Room 5650 MIB) - 1
WO-760 (Room 406 LS) - 1
DMs-Burns, Prineville, Vale, Spokane (information only) - 1 each
Landscape Analysis Study Team members (see Attachment 1) - 1 each
Tom Nygren, Director of Planning, USDA, Forest Service, Region 6 - 1

WESTERN OREGON LANDSCAPE ANALYSIS STUDY TEAM

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LAKEVIEW DISTRICT - KLAMATH FALLS RESOURCE AREA		
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Jim Vienop, Interdisciplinary Team Leader	885-4214	884-2097

Step 1: Delineation of Landscape Analysis Units

Although ESBM does not necessarily follow administrative boundaries, it is important to establish and map landscape analysis units (LAUs) for management and analysis purposes. A variety of landscape hierarchies could be logically supported under an ESBM approach, but for this exercise it is important to develop a common framework for organizing information that will be consistent across districts, adjacent national forests and other land ownerships. By using a common hierarchical approach, landscape information can be functionally aggregated or subdivided to meet a variety of needs at different scales.

Landscapes in general are being defined according to Forman and Godron (1986) and Diaz and Apostol (1992), as listed in Attachment 3. For landscape analysis purposes, we will delineate LAUs from the Hierarchy of Geographic Landscape Areas shown in Attachment 3. The areas within this hierarchy are "nested" (i.e., aggregations of sub-units perfectly match the larger unit boundaries) and interact with each other (i.e., they cannot be analyzed in isolation from one another). Given these conditions, the following criteria should be used to delineate LAUs in your district:

1. LAUs will be based on natural features
2. LAUs will generally be aggregates of sub-watersheds (i.e., they can be no smaller than their sub-watershed and no larger than their analytical watershed)
3. LAUs will usually ignore property and administrative boundaries (as well as Land Use Allocation boundaries identified in the RMPs) and will incorporate all ownerships
4. LAUs will edge-match with adjacent LAUs (e.g., adjacent Resource Areas, Forest Service Ranger Districts, etc.) to preclude gaps or overlaps

It is recognized that some resource data will "flow through" or overlap several LAUs (e.g., big game areas, transportation corridors, etc.). Regardless of which system is chosen to base landscape boundaries on, analyses of data (e.g., interrelationships, natural patterns, energy flows, and disturbance regimes) will likely involve cross-boundary examination and coordination.

[Note: The final report of the Forest Ecosystem Management Assessment Working Group may result in changes in how landscapes are delineated. Such changes are not expected to substantially alter the analyses outlined in this guidance. Any substantive changes will be incorporated in this guidance and distributed to field offices in a timely manner.]

Step 2: Prioritizing Landscape Analysis Units for Initial Efforts

Resource Area Managers should prioritize management actions anticipated for implementation in FY 94-95 and focus their initial landscape analysis efforts toward those LAUs containing the FY 94-95 actions. At a minimum, all anticipated FY 94-95 timber sales should be screened, using the LAU analysis, to ensure consistency with the objectives of the LAU and the current preferred alternative of the RMP. (See IM No. OR-93-129 regarding workload priorities for the remainder of FY93.) Highest priority units for initial efforts would be those containing a variety of FY 94-95 forest ecosystem management and enhancement actions that provide a good opportunity to conduct an integrated, ecosystem-management analysis.

It is strongly recommended that some form of interdisciplinary team be used to complete each of the following steps. For some steps, it may be efficient to develop a small (3-4 person) "core team" of knowledgeable specialists, while for other steps, it may be beneficial to convene a team consisting of a full complement of resource specialists.

[Note: Much of the information needed to complete this initial analysis should already be available from the RMP effort. It should not be necessary to collect large amounts of new field information for this task. Remember that this is only a first generation effort that will be built upon as we become more proficient in the process and as new information and understanding develops. Note also that several elements in this interim guidance focus largely on BLM-administered lands. But it is also

important to evaluate existing resource information and planned management actions on non-BLM lands to the extent that they are known.]

Step 3: Analysis and Documentation for Each Landscape Analysis Unit

Prepare a written summary document that would include the following information and analysis for each Landscape Analysis Unit:

1. **Description of the Existing Environment Within Each LAU:** The description/data should be prepared for the entire landscape unit regardless of land ownership. In many cases, tables may be appropriate to supplement a narrative. It may be useful to display some data by splitting or combining information from both public and private lands. Data for non-BLM lands may be obtained through use of aerial photos, meetings and telephone contacts with adjacent agencies and ownerships, and other State/County information sources. (It is not crucial to seek out information that is not readily available at this initial stage of our landscape analysis process.)

   The LAU description should include two parts:

   a. A brief overview that describes the significant geographic, human and resource features of the landscape unit, and

   b. Resource-specific information. *At a minimum, a qualitative and, where possible, a quantitative description of the aggregate condition of the resources across all ownerships in the LAU should be discussed.* Following is a list of items to consider for inclusion in this section. Briefly describe those items relevant to the particular LAU, and add any other items not listed but considered significant to the LAU.

   - Watershed history, including effects of previous natural disturbances and land use activities on watershed processes
     - Natural disturbance and succession
     - Stream/riparian stability and condition (good/fair/poor in miles)
     - Soils
     - Wetland locations and conditions
     - Transient snow zones
     - Energy flows into and out of the landscape and seasonal variations (considering potential implications to ecosystem tolerance or vulnerability to stresses)
     - Inventory of past land use practices
       - road locations and density
       - clearcuts
       - other surface disturbances (e.g., mining, off-road vehicle use)
       - compacted acres
   - Cultural Resources
   - T/E species (plant and animal) known to be present
   - Condition of owl dispersal habitat
   - Fisheries information (particularly anadromous fish)
   - Special forest products
   - Major vegetation communities or ecological zones
   - Age class distribution of forest stands
   - Mineral resources
   - Recreation resources/uses
   - Rural interface
   - Significant resource interrelationships/interactions
   - Significant travel routes/corridors for humans and wildlife
   - Visually sensitive areas
   - Other rare, unusual, critical or unique landscape elements
   - Fire and fuels management considerations
   - Significant linkages to other LAUs and larger landscapes

There are several Forest Service publications regarding landscape analysis that Area Managers may want to refer to for ideas on what might be included in this section in order to adequately describe the LAU and how to best organize the information (e.g., *Forest Landscape Analysis and Design: A Process for Developing and Implementing Land Management Objectives for Landscape Patterns* by Nancy Diaz and Dean Apostol, Region 6, publication no. R6 ECO-TP-043-92).

2. **Resource Management Concerns and Opportunities:** While this section is intended to incorporate all lands in the LAU in the long term, BLM-administered lands should be the primary focus in the short run. Concerns and opportunities related to non-BLM lands can be added as such information is acquired.

3. **LAU Objectives:** In this section, goals/objectives from the RMP are customized to the particular resources, conditions and processes in the LAU (that you documented in Step 3, item 1). Documentation should include a short narrative which prioritizes BLM management goals and objectives for the LAU based on the most recent preferred alternative for the RMP.

   To develop LAU objectives, first, list the RMP goals and objectives determined to be relevant to the specific landscape unit. Then translate these goals/objectives into local analysis unit goals/objectives and desired future conditions (or range of acceptable conditions) specific to the particular resources, conditions and processes in the LAU. For localized goals/objectives, an example might be "within the GFMA portion of the unit, the long-term goal is to harvest commercial forest lands at a rate resulting in a balance of seral stages within the landscape. A higher proportion of residual trees will be retained, individually and in groups, to mitigate the area's susceptibility to growing season frost." Desired future conditions could be "a high level of ecological diversity and the maintenance of all seral stages of forest development. Fifteen percent of the unit would be maintained in a mature to old-growth condition. Streams and riparian management zones would be stable and provide natural biological functions. Compacted areas would be below 5 percent in each sub-watershed."

   Other resource-specific objectives relevant to the landscape unit (e.g., Transportation Management Objectives pursuant to IB No. OR-93-409) should similarly be customized to the LAU's particular resources, conditions and processes or incorporated into the objectives translated from the RMP.

4. **Implementation Guidelines:** List LAU-specific guidelines (i.e., standards, limitations and constraints) that need to be considered in developing implementation strategies for meeting LAU objectives. Most of these guidelines should be available from the RMP (e.g., Best Management Practices, project design features, resource or land use allocation constraints).

5. **Actions Needed to Reach LAU Objectives:** This item should describe actions needed to meet LAU-specific objectives (i.e., how we propose to obtain them). It would include a brief description of an implementation strategy for specific actions needed to reach long-term management goals, objectives and desired future conditions (e.g., enhance 3 miles of stream and harvest 12-13% of 100+ age classes, 10-15% of the 50-110+ age class this decade).

6. **Support Needs:** This section lists the support needs (e.g., workforce, budget, coordination, coordinated activity plans, public involvement, monitoring plans, partnerships, etc.), as well as the data gaps/inventory needs, considered necessary to reach desired future conditions and to implement specific projects.

6. **Implementation Timeline** (optional): Develop a timeline showing the priority and timing of implementation actions needed to reach resource objectives and goals.

The end product of the above process would be a working "tool" which may need to be regularly updated as information, issues and objectives change over time. The completed document should provide the on-the-ground management unit with a landscape-level analysis and resource area-specific RMP implementation direction for FY 94-95. This tool can also be used to evaluate proposals for RMP consistency and conformance and for their effects on landscape-level phenomena. A sample document is being developed to further assist LAU analysis teams.

Hierarchy of Geographic Landscape Areas and Definitions

Hierarchy of Geographic Landscape Areas

- Water Resource Regions and Sub-Regions (USGS)
  - Hydrologic Unit (USGS)
    - Analytical Watershed (RMP)
      - Landscape Analysis Unit
        - Sub-Watershed
          - Stand-OI Unit (Ecological Site)

Note: These geographic landscape units are "nested" (i.e., aggregations of sub-units perfectly match the larger unit boundaries) and interact with each other (i.e., they cannot be analyzed in isolation from one another).

Definitions

Water Resource Regions and Sub-Regions: U.S. Geological Survey terms referring to aggregations of hydrologic units in river basins.

Hydrologic Unit: U.S.G.S. hydrologic area used to delineate distinct watersheds within river basins.

Analytical Watershed: For BLM Resource Management Planning purposes, a drainage basin subdivision of Hydrologic Units used for analyzing cumulative impacts on water resources.

Landscape Analysis Unit (LAU): A functional concept used to describe an operating area ranging from a single sub-watershed to an analytical watershed. It is the ecosystem unit upon which landscape patterns will be analyzed. These areas will typically be 5,000 to 50,000 acres in size (not an absolute range).

Sub-Watershed: A hydrologic sub-basin within an LAU. It is the minimum size unit needed for hydrologic cumulative effects analysis. It cannot be larger than a landscape analysis unit and will often range from a few hundred to around 5,000 acres in size. Also referred to as a "compartment" in some BLM districts.

Stand-OI Unit (Ecological Site): For data collection purposes, a land area which delineates ecological site-level information. For forested landscapes on BLM-administered lands, the ecological site level is a forest stand, and stand-level information has been collected under the term, "Operations Inventory" (or OI).

Landscape: "... a heterogeneous land area composed of a cluster of interacting ecosystems that is repeated in similar form throughout." For Pacific Northwest forests, this translates to areas drained by major streams, within which climate regime, geomorphic processes and natural vegetation patterns are fairly uniform. It is the building block of biotic provinces and regions. (Forman and Godron, 1986, and Diaz and Apostol, 1992).

BUREAU OF LAND MANAGEMENT
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In Reply Refer to:
1736 (931)

August 25, 1993

Information Bulletin No. OR-93- 605

To: DSDs, Staff and Branch Chiefs, and District Managers: Salem, Eugene, Roseburg, Medford, Coos Bay, and Lakeview

From: State Director

Subject: Initiation of Landscape Analysis Process in Support of Ecosystem-Based Management in Western Oregon RMPs

As indicated in Information Bulletin No. OR-93-478 issued on June 16, 1993, periodic updates will be made as new information or issues are developed on this subject. At the Landscape Analysis Study Team meeting in Eugene on August 4-5, Districts discussed their progress on the landscape level analysis workload. Several team members expressed concern about doing additional work on this process until the President's plan, including the FEMAT report and DSEIS, was better understood, and such procedures as watershed analysis were better defined. Although the concerns are valid and much of the details for implementing the President's plan are in the developmental stages, I want to reiterate my concern that you proceed with this priority workload as outlined in the June 16th Information Bulletin. The concepts of ESBM, including landscape level watershed analyses, remain valid even though some of the parameters are changing.

The following information reflects new information or changes that have emerged to date:

1. Composition of the Western Oregon Landscape Analysis Study Team has changed to include additional members, as noted in the revised Attachment 1.

2. A consistent process for defining sub-watersheds and landscape analysis units in the GIS system has been worked out and is attached for your information (Attachment 2). While it may be designated as the standard process for District use, we first want to see what comes from our work with the interagency implementation team.

3. We have identified sources of existing high level aerial photography that can be used to delineate watershed sub-basins and landscape analysis units, and assist in your initial analytical workload for these areas. All Districts have been contacted as to their need for these products. At this time, we are preparing an order for:

Lakeview--Klamath Falls Resource Area; Eugene--all Resource Areas; and Salem--Alsea, Clackamas, and Santiam Resource Areas. Other Districts have existing photos that will meet their short-term needs. Photos are 1990-91 vintage, with some 1992-93 coverage for parts of Eugene and Salem. Scales range from 1:31,680 to 1:40,000. We plan to have these photos available by October/November.

4. Given our limited experience with this kind of workload, the team agreed to share information and examples as we gain experience through the process. The team believes no set style or sample document should be prepared which would limit our thinking and creativity for these initial efforts. Rather, the team plans to build on the early results, which may result in slightly different adaptations of the analysis.

If you have questions or comments regarding this supplemental guidance, please contact Bob Alverts or Jerry Magee in the State Office (503-280-7357 and 280-7086, respectively) or your team representative.

Robert J. Rivers
Associate State Director
Acting

2 Attachments
1 - Revised Study Team List (1 p)
2 - Coding format for GIS Watershed Theme (9 pp)

Distribution
WO-230 (Room 208 LS) - 1
SC-210 - 1
OR-930 - 1
OR-931 - 1

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GIS Watershed Theme

Each District will create a watershed theme in the GIS environment to be used as a tool in landscape analysis. The Coos Bay District has built an example theme with an attribute file, that is now in test operation. This process will be adopted by the other districts for use in their landscape analysis. The watershed theme can be retrieved from: <CO306>MOSSDATA>WATERSHED>CBAWS. A CBAWS.AT file is also available using the same pathname.

The theme is composed of a hierarchy of seven watershed levels. The largest levels are based on the accepted Hydrologic Units of the USGS. The levels are shown in descending order.

Watershed	Description	Field Length
Region	USGS Hydrologic unit	17
Subregion	USGS division of region	29
Accounting Unit	USGS division of subregion	23
Cataloging Unit	USGS division of Accounting Unit	25
Analytical Watershed	BLM analytical watershed, a division of the USGS Cat. Unit	21
Subbasin* (Optional)	BLM subbasin, a division of the AWS	20
Subwatershed (Compartment)	A division of the subbasin	20
Landscape Analysis Unit	A geographic area ranging from a subwatershed to AWS size	20

(* Note: The Coos Bay theme uses a division of the Analytical Watershed called a subbasin. This may be identical to the Landscape Analysis Unit (LAU) identified in the June 16 Information Bulletin on Landscape Analysis. The LAU may or may not be nested due to other considerations.)

The Subwatershed is a term used in the landscape analysis hierarchy. In some districts this may have been called a compartment. The Coos Bay example GIS theme uses the term compartment.

As can be seen, subwatersheds are the smallest watershed level and nested within the subbasin, which are nested within the AWS, and so on. The first four levels are US

Geological Survey Hydrologic Units. These are obtained from the State Hydrologic Unit Maps[1] from the USGS.

The field length refers to the maximum character length within each level.

A unique 17 character alpha-numeric code identifies each watershed. For example 17100207_2450101W.

HUC Region	HUC Subreg.	HUC Acc.Un	HUC Cat.Un	_	AWS	Sub	Comp.	Type W/F
xx	xx	xx	xx		xxx	xx	xx	

Where: HUC = 2 digit numeric USGS hydrologic unit code

_ = Underscore place holder that allows the user to use wildcard selections on the subject without having to type the 17 digit code.

AWS = 3 digit numeric BLM Analytical Watershed code

Sub = 2 digit numeric code for the Subbasin created by the district.

Comp = 2 digit numeric Compartment (subwatershed) code created by the district.

Type = 1 digit alpha code for type of watershed. W means a discrete closed watershed and F means one or more facing drainages to a mainstream whose combination does not close to form a discrete watershed.

The GIS MOSS map companion attribute file references the seven watershed levels, as well as tracking item number and polygon subject name. By knowing the ID or key name, one can select a watershed level of interest. When a level is selected above the compartment level, all smaller polygons are included.

The following is a sample of the Attribute Header Information used by Coos Bay for the watershed theme in GIS.

ID	TY	—KEY—	—DESCRIPTOR—
1	CH	SUBJECT	POLYGON SUBJECT NAME
2	IN	ITEM	
3	CH	REGION	DRAINAGE ULTIMATELY DRAINING INTO PACIFIC OCEAN FROM OREGON
4	CH	SUBREGION	MAJOR SUBDIVISION OF THE REGION
5	CH	BASIN	ACCOUNTING UNIT - MAJOR SUBDIVISION OF THE SUBREGION

---

[1] Seaber, P., F.P. Kapinos, and G. Knapp 1984. State Hydrologic Unit Maps. US Geological Survey Open File Report 84-708.

```
6 CH CATALOGUE  CATALOGING UNIT - A SUBDIVISION OF THE BASIN
7 CH AWS        ANALYTICAL WATERSHED - A SUBDIVISION OF THE CATALOGING UNIT
8 CH SUBBASIN   B.L.M. SUBWATERSHED DESIGNATION
9 CH COMP       COMPARTMENT WATERSHEDS OF THIRD TO FIFTH ORDER DRAINAGES
```

In addition a new attribute will be added for the landscape analysis unit. It will be a 20 character field for the common name of the LAU. It would be seen in GIS as:

```
10 CH LAU       BLM LANDSCAPE ANALYSIS UNIT
```

The common names for watersheds will also be used as the attributes. Watersheds on GIS maps can then be labelled with the common name instead of the subject number. If one was to query a particular item in the watershed map, the following would come up in GIS.

```
ITEM HAS THE FOLLOWING CHARACTERISTICS
SUBJECT      = 17100305_2001000F
MAPNAME      = CBAWS
AREA         =      32122.77 ACRES
ENTER 0-FOR ALL   1- 9-FOR SPECIFIC  [0]
: 0
SUBJECT       17100305_2001000F
ITEM                 7
REGION        PACIFIC NORTHWEST
SUBREGION     OREGON-WASHINGTON COASTAL
BASIN         SOUTHERN OREGON COASTAL
CATALOGUE     COQUILLE
AWS           MIDDLE_FORK_COQUILLE
SUBBASIN      CAMAS VALLEY
COMP
LAU (to be added)
POINT TO ITEM, SPACE WILL REPEAT
```

A set of standard abbreviations were established to condense the descriptor names in the attribute, and make Bsearch queries possible. For example, Creek in compartment name Bear Creek is abbreviated CR, river is R, North Fork is NF, and so forth. Following is a complete listing of these abbreviations:

N	North
S	South
E	East
W	West
NF	North Fork
SF	South Fork
EF	East Fork
WF	West Fork
CR	Creek
FK	Fork
MTN	Mountain
R	River

TRIB Tributary

Note: Upper, Middle, and Lower are not abbreviated.

Also attached is a complete listing of Analytical Watersheds with their unique three digit code.

FOR THE MAP WORESAWS THERE ARE 284 POLYGONS

Use the Item for the three digit numeric code for the AWS. (Remember the leading zeros)

SUBJECT	ITEM
01_BEAR_CREEK	1
01_BIG_BUTTE_CREEK	2
01_COW_CREEK_GALESVILLE	3
01_COW_CREEK_GLENDALE	4
01_DEER_CREEK	5
01_ELK_CREEK	6
01_EVANS_CREEK	7
01_GRAVE_CREEK	8
01_JENNY_CREEK	9
01_JUMPOFF_JOE_CREEK	10
01_KLAMATH_SPENCER_CREEK	11
01_LITTLE_APPLEGATE	12
01_LITTLE_BUTTE_CREEK	13
01_LOST_CREEK	14
01_LOWER_APPLEGATE	15
01_MIDDLE_APPLEGATE	16
01_ROGUE_GOLD_HILL	17
01_ROGUE_GRANTS_PASS	18
01_ROGUE_REC_SECTION	19
01_ROGUE_TRAIL_CREEK	20
01_ROGUE_WILD_SECTION	21
01_UPPER_APPLEGATE	22
01_WEST_FORK_COW_CREEK	23
01_WILLAMETTE_R	24
01_WILLIAMS_CREEK	25
02_BEAR_CREEK	26
02_BIG_BUTTE_CREEK	27
02_COW_CREEK_GALESVILLE	28
02_COW_CREEK_GLENDALE	29
02_DEER_CREEK	30
02_ELK_CREEK	31
02_EVANS_CREEK	32
02_GRAVE_CREEK	33
02_JENNY_CREEK	34
02_JUMPOFF_JOE_CREEK	35
02_LITTLE_APPLEGATE	36
02_LITTLE_BUTTE_CREEK	37
02_LOST_CREEK	38
02_LOWER_APPLEGATE	39
02_MIDDLE_APPLEGATE	40
02_ROGUE_GOLD_HILL	41
02_ROGUE_GRANTS_PASS	42
02_ROGUE_REC_SECTION	43
02_ROGUE_TRAIL_CREEK	44
02_ROGUE_WILD_SECTION	45
02_UPPER_APPLEGATE	46
02_WEST_FORK_COW_CREEK	47
02_WILLAMETTE_R	48
02_WILLIAMS_CREEK	49
03_BEAR_CREEK	50
03_BIG_BUTTE_CREEK	51
03_COW_CREEK_GLENDALE	52
03_DEER_CREEK	53
03_ELK_CREEK	54
03_EVANS_CREEK	55
03_GRAVE_CREEK	56
03_JENNY_CREEK	57
03_JUMPOFF_JOE_CREEK	58
03_LITTLE_APPLEGATE	59

03_LOST_CREEK	61
03_LOWER_APPLEGATE	62
03_MIDDLE_APPLEGATE	63
03_ROGUE_GOLD_HILL	64
03_ROGUE_REC_SECTION	65
03_ROGUE_TRAIL_CREEK	66
03_ROGUE_WILD_SECTION	67
03_WEST_FORK_COW_CREEK	68
03_WILLAMETTE_R	69
03_WILLIAMS_CREEK	70
04_BEAR_CREEK	71
04_BIG_BUTTE_CREEK	72
04_COW_CREEK_GLENDALE	73
04_DEER_CREEK	74
04_ELK_CREEK	75
04_EVANS_CREEK	76
04_GRAVE_CREEK	77
04_JENNY_CREEK	78
04_JUMPOFF_JOE_CREEK	79
04_LITTLE_APPLEGATE	80
04_LITTLE_BUTTE_CREEK	81
04_LOWER_APPLEGATE	82
04_MIDDLE_APPLEGATE	83
04_ROGUE_GOLD_HILL	84
04_ROGUE_REC_SECTION	85
04_ROGUE_TRAIL_CREEK	86
04_ROGUE_WILD_SECTION	87
04_WEST_FORK_COW_CREEK	88
05_BIG_BUTTE_CREEK	89
05_COW_CREEK_GLENDALE	90
05_DEER_CREEK	91
05_EVANS_CREEK	92
05_GRAVE_CREEK	93
05_JENNY_CREEK	94
05_LITTLE_BUTTE_CREEK	95
05_LOWER_APPLEGATE	96
05_ROGUE_GOLD_HILL	97
05_ROGUE_REC_SECTION	98
05_ROGUE_TRAIL_CREEK	99
05_ROGUE_WILD_SECTION	100
06_BIG_BUTTE_CREEK	101
06_COW_CREEK_GLENDALE	102
06_DEER_CREEK	103
06_EVANS_CREEK	104
06_GRAVE_CREEK	105
06_JENNY_CREEK	106
06_LITTLE_BUTTE_CREEK	107
06_ROGUE_REC_SECTION	108
06_ROGUE_TRAIL_CREEK	109
06_ROGUE_WILD_SECTION	110
07_COW_CREEK_GLENDALE	111
07_EVANS_CREEK	112
07_GRAVE_CREEK	113
07_LITTLE_BUTTE_CREEK	114
07_ROGUE_REC_SECTION	115
07_ROGUE_WILD_SECTION	116
08_LITTLE_BUTTE_CREEK	117
09_LITTLE_BUTTE_CREEK	118
10_LITTLE_BUTTE_CREEK	119
ABERNATHY_CREEK	120
ABIQUA_CREEK	121
ALSEA_BAY	122
ALSEA_FRONTAL	123
BEAR_CREEK	124
BEAR_CREEK_SALE	125

BEAVER_CREEK	126
BIBLE_CK	127
BIG_R	128
BULL_RUN_RIVER	129
BUTTE_CREEK	130
CALAPOOIA_R	131
CALAPOOYA	132
CALIF_SMITH_RIVER	133
CAMP_CREEK	134
CANTON_CREEK	135
CAPE_FERRELO_FRONTAL	136
CHETCO_RIVER	137
CLACKAMAS_FRONTAL	138
CLATSKANIE	139
CLEAR_CK_(KILCHIS)	140
CLEAR_CREEK_(CLACK)	141
COAST_CREEK	142
COAST_FK_WILLAMETTE	143
COOS_BAY_NORTH	144
COOS_BAY_SOUTH	145
COTTONWOOD_CREEK	146
COW_CREEK	147
CRABTREE_CREEK	148
CROOKED_CREEK	149
DAIRY_CREEK	150
DEEP_CREEK	151
DEER_CREEK_(YAMHILL)	152
DRIFT_CREEK_(ALSEA)	153
DRIFT_CREEK_(SILETZ)	154
EAGLE_CREEK	155
EAST_FORK_COQUILLE	156
EAST_FORK_DAIRY_CK	157
EAST_FORK_NEHALEM	158
ELK_CREEK_(NESTUCCA)	159
ELK_CREEK_ROSE	160
ELK_RIVER	161
FALL_CREEK	162
FEAGLES_CREEK	163
FISH_CREEK	164
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UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
Oregon State Office
P.O. Box 2965 (1300 N.E. 44th Ave.)
Portland, Oregon 97208

November 10, 1993

In Reply Refer to:
7200 (932)

Information Bulletin No. OR-94- 081

To: DSDs, Staff and Branch Chiefs, DMS: Salem, Eugene, Roseburg, Medford, Coos Bay, Lakeview, Burns, Prineville, Spokane, Vale

From: State Director

Subject: Watershed Based Landscape-level Analysis for FY 1994

This memorandum supplements Information Bulletins OR-93-478 and 605 and is intended to help answer some of the questions that surround this topic and to clarify our current direction concerning watershed based landscape-level analysis workloads for FY 1994.

First, we want to reassure you that our initial procedures, as outlined in Information Bulletins OR-93-478 and 605, are still relevant. Districts are making good progress on these initial analyses, and effective interaction is occurring with adjoining Districts and National Forests. You should continue this activity and move forward to develop initial analyses using the criteria listed below for selecting priority areas. Attached is a sample interagency document, jointly developed by the Eugene and Salem Districts and the Siuslaw and Willamette National Forests, that incorporates the process outlined in our Information Bulletins and that meets Forest Service needs (attachment 1). Other field units should find this example to be useful.

Second, we want to clarify the direction in the PAWP advices that required Districts to complete watershed analyses on one-third of the land area this fiscal year. That direction was intended to parallel Forest Service guidance and convey the magnitude of effort expected on this workload, but it is no longer a requirement.

You should focus instead on the following criteria for selecting areas for watershed based landscape-level analysis (it may be less than one-third of the total land, so long as a cross-section of all the priority areas get done) :

- Key watersheds and riparian reserves outside common Forest Service land areas, where salmon restoration activities are planned.

- Areas where restoration activities other than salmon restoration are planned for jobs in the woods program.

- Areas where, based upon existing information, timber sales, silvicultural demonstration projects and other activities could occur without precluding future options (i.e. in the GFMA and outside critical habitat, AMAs, and Key watersheds).

You should know that Conference Report language in the Interior Appropriations Bill gives us the flexibility to reprogram dollars in order to complete watershed analysis. Instruction Memorandum OR-94-061 provides a general idea of what you might expect in the final AWP advises. Given the emphasis placed on watershed analysis by Congress and the President's forest plan alternatives, we would expect each western Oregon District to dedicate about $1 million, including overhead, for watershed analysis in FY 1994.

Given the Congressional emphasis and the direction contained and reaffirmed in this memorandum, each District is to develop an action plan that identifies those areas where you intend to focus your initial watershed/landscape analysis for FY 1994. To assist you we have attached a form we would like completed and returned to DSD, Lands and Renewable Resources by December 6, 1993 (attachment 2). A separate form should be completed for each watershed being analyzed. This information will be valuable to other Districts, OSO staff, and the interagency teams as we jointly pursue FY 1994 activities.

Third, you should be aware that there are a number of other committees and groups working on various aspects of watershed analysis. Most of these are part of nineteen different interagency groups working on various aspects of the President's forest plan for the Pacific Northwest. Some District employees are valuable members of these teams, and we appreciate their contribution. Each of these groups is trying to help bring common direction and methodologies to field units. This includes teams that are:

- digitizing watershed information on the GIS system

- developing selected chapters for a watershed analysis handbook

- developing interim guidance for FY 1994 watershed analysis

- developing common data elements and standards

As you know we began to develop our landscape analysis process before the Forest Conference was held and the FEMAT process began. Early on we determined that landscape/watershed analyses are important tools in an ecosystem-based approach. Our work

As you know we began to develop our landscape analysis process before the Forest Conference was held and the FEMAT process began. Early on we determined that landscape/watershed analyses are important tools in an ecosystem-based approach. Our work with the interagency teams allows us to develop a process that will apply more effectively to multiple ownership areas and will help transition from initial watershed/landscape analysis efforts for FY 1994 to the analytical process used in subsequent years under any Forest Plan decision.

As further information is developed, it will be sent to field units. For example, we expect to issue interagency watershed/landscape analysis guidance on an interim process once the Final Supplemental EIS Record of Decision is complete. This guidance should not be inconsistent with your current direction, but should build on that foundation. Part of that direction may include developing 8-10 pilot watershed/landscape analyses throughout western Oregon and Washington to test procedures. We are thinking about different physiographic areas that would involve BLM, Forest Service, and other landowners as appropriate. Examples might include the Rogue Basin and the Applegate partnership area, the Portland municipal watershed, the Little River adaptive management area, and the Nestucca watershed. Each District can expect work in some area of joint importance to other landowners, and which focuses on priority resource issues.

A watershed handbook is also expected to be released about when the ROD is done. The handbook will ultimately contain a number of sections which focus on all dimensions of a watershed- based landscape analysis process, although most will not be completed when the handbook is first released. The first version will focus primarily on physical characteristics of stream channels, with limited additional sections on aquatic resources. We expect interagency teams to develop the remaining chapters over the next one to two years. Once complete, the handbook will provide the principal guidance for preparing detailed watershed/landscape analyses. This further demonstrates the need for both interim direction and a transition period for logical development of the watershed/landscape-level analysis processes.

Your continuing efforts to perform quality work on this important subject is appreciated. We remain committed to developing an orderly, reasonable process that will meet our objectives. We all need to recognize that this process is evolving, so there will be questions and details that we cannot yet answer. Several of you have already shared some of your concerns. It is important for members of the western Oregon Landscape Analysis Study Team to understand and discuss with others emerging issues/concerns/problems that develop as we work through this process.

It is also important for field units to share results with one another, so that we may learn from each other, and avoid recurrent problems. Should you have additional questions, please contact Bob Alverts at 280-7357, or Bill Brookes at 280-7054.

William C. Fanning

William C. Fanning
Acting
Deputy State Director for
Lands and Renewable Resources

2 Attachments
- 1 - Proposed Procedure/Process for Landscape/Watershed Analysis (6 pp)
- 2 - Watershed Analysis Form (blank) - (1 p)

Distribution
WO-200 (Room 5650, MIB) - 1
SC-213 - 1
OR-930 - 1
OR-932 - 1
Western Oregon Management Team

of BLM/FS Cooperative Process
Salem/Eugene Dist/Siuslaw/Willam NFs

October 7, 1993

TO:

FROM: Dan Howells

SUBJECT: Proposed Procedure/Process for Landscape/Watershed Analysis

The following attempts to outline a process for watershed/landscape analysis by applying the concepts of landscape ecology and the requirements of Option 9. The steps were adopted from the landscape analysis procedures described in Diaz & Apostol's "Forest Landscape Analysis and Design" (R6-ECO-TP-043-92), the Agusta Creek project, Reid and McCammon's "A Procedure for Watershed Analysis", and the discussion between USFS Siuslaw NF and BLM personnel at watershed analysis coordination meetings in September at Corvallis.

For the Eugene District, the following process is recommended and is considered a suitable watershed analysis. Initial analyses will start by examining all BLM lands within a watershed in a fairly quantitative manner and a very rough, qualitative characterization of private lands where we have data. The following process is recommended:

Part 1 Analysis: identification of the biological and physical capabilities of the area, current uses, and the interactions between the different parts of the watershed and the relationship to surrounding landscapes/watersheds.

Part 2 Synthesis: a description of the current landscape/watershed conditionin terms of spatial patterns, landscape elements, and landscape processes.

Part 3 Planning/Design: identification of the target future landscape, design of the spatial distribution of landscape elements in the watershed, management opportunities to drive the watershed towards the target, recommending or developing potential projects to implement, recommending alternatives for these projects,, and fine tuning management objectives.

Part 4 Project Evaluation Compliance/Implementation: identification of specific resource management alternatives, conflict resolution and/or mitigation on a project or site specific level, public involvement as per NEPA, and development of the EA/ROD.

If a significant resource conflicts exist or a high level of uncertainty exist due to data gaps in the analysis of the overall watershed, then a Level II analysis must be performed. A Level II analysis requires analyzing all lands within the watershed in a more quantitative analysis.

ATTACHMENT 1-1

INTRODUCTION: Purpose and Definition.

Watershed/landscape analysis is a systematic, procedure for characterizing watershed processes and ec processes to meet specific management and social objectives (FEMAT). For watershed/landscape analysis the larg natural processes (fire, wind patterns, vegetation potential, geomorphological and ecological processes) will be con in the analysis in order to recognize the range of natural capabilities. Selection of management objectives for a wa will acknowledge these larger scale processes and be consistent with them. Watershed/landscape analysis and the r plans will be tiered to province/river basin plans and are to be viewed as a dynamic processes subject to chan revision in future years.

The purpose of watershed analysis is to:

- provide information to guide management prescriptions, including setting and refining bounda Riparian Reserves and other reserves.
- develop management strategies to maintain diversity and sustainable long-term productivity.
- determine the desired future conditions and target landscape pattern for lands within a given wate
- develop restoration strategies and priorities.
- provide the basis for monitoring; eg to identify indicators for monitoring change.

ASSUMPTIONS: The following assumptions apply to the watershed/landscape analysis process:

- landscape patterns: the composition, structure, size and arrangement of patches, and patch vari exercise profound influence on the processes within a watershed. Landscape patterns can not casual results of management activities. Relationships between landscape structures, landscape flow ecological processes must be considered in determining stand conditions in a watershed.
- major disturbance processes: fire, wind, landslides, and floods have determined the landscape p "natural" to the area.
- human activities: whether Native American or post-settlement, have overlaid another set of pattern processes on the landscape which also affect the structure and function of the watershed.
- the "Range of Natural Conditions" is the working criteria for evaluating impacts on ecos sustainability from management options. It is not desirable to operate at either extreme of the ran natural conditions.
- the boundaries for watershed/landscape analysis will be a watershed. The analysis will be cond on watersheds the range in size from 8,000 to 80,000 acres. Considering that the Coast Range typ has smaller watersheds, this is still consistent with the direction and intent of FEMAT.
- existing data will be the information base available to conduct watershed/landscape analysis. collection of new or additional data is not envisioned in the first generation of analyses.
- the time frames required to produce a watershed/landscape analysis is approximately 3 months util a 3 to 5 person analysis team with access to additional specialists.
- Option 9, the President's preferred alternative, or some similar revised Option 9, will be impleme The driving management concerns for watershed analysis are maintaining and restoring watersheds, reducing fragmentation of late successional forests.

END PRODUCT OF THE ANALYSIS:

The end product of watershed/landscape analysis should be a spatial design of landscape areas with a rang terrestrial and aquatic conditions appropriate for each landscape area. This may be thought of as the target landscape sets of patch sizes and prescriptions customized to each landscape area. and a proposed schedule of activities or e for moving the landscape pattern towards the target condition. The future target condition reflects human values and

NALYSIS PROCESS:

ATTACHMENT 1-2

1. Watershed Context & Larger Scale Perspectives.

Objective of this step: Describes how the watershed relates to the surrounding landscape at larger scales.

Option 9 ultimately will (should) provide two additional planning layers to guide and focus the analysis proce on a specific watershed/landscape area: a provincial analysis and a major river basin analysis. These broad analyses are expected to provide a broad characterization of the processes, elements, and resource issues whi apply to the specific watershed under analysis as a part of the larger landscape/ecosystem scale in which it situated. When these planning/analysis documents become available, watershed/landscape analysis teams will able to reference them for placing their watersheds in context and perspective. Until then, each team will ne to supply an analysis on their own. In either cases, the teams will need to assess how their watershed is relat to these larger scales with regards to resource issues and landscape elements identified as important in the larg context.

A. Describe general features of the watershed:
- location, drainages, climate, general vegetation, geomorphology,
- ownership patterns, towns/communities present or nearby,
- unique features or functions (ie DCA, matrix lands, municipal watershed, etc).

B. Consider the following topics:
- surrounding land uses: private timber land managed on short rotations, urban areas close b intermingled agricultural and farm lands. Each type of land use contributes and provid different habitats and creates different impacts.
- stream networks: How does the watershed influence downstream resources and uses?? Is th watershed tributary to a major river basin ??
- fish and wildlife: What species move in and out of the watershed ?? What specific habitats a required by these species ??
- people: Is there an urban area nearby which might influence recreation use of the area ?? A there communities within the watershed that connect it to other areas ?? Are there municip water supplies located within the watershed ??
- look at the "BIG" picture: at the scale of the watershed, look at adjacent watersheds, the enti river basin, and/or physiographic province.

C. Resource conditions and issues from the Provincial/River Basin scale that are outside of t watershed/landscape being analyzed, but that constrain, prioritize, or focus the analysis.

2. Landscape elements, patterns, and processes.

Objective of this step: to describe what the analysis area looks like, why it looks that way, how is it functionin and how is it suppose to function.

The following steps may be done in any order. One could describe how the area looks and then why it loo that way, or vica versa. This step focuses on identifying the structural elements of the landscape, the flow movements, and interactions between landscape elements, and the disturbance and succession processes that ha shaped the landscape/watershed in the past.

A. *What does the landscape/watershed area look like ??* The objective of this step is to describe t structural characteristics of the area as well as flows and movements between the structural elements.
1. Identify and map structural elements of the landscape (patches, matrix, corridors).
2. Identify the flows/movements that occur in the landscape area; both natural and human.

ATTACHMENT 1-3

- wildlife migration
- fish
- people
- large woody debris
- soil movement/debris flows

B. *Why does the watershed/landscape area look the way it does ??* The objective of this step i characterize the disturbance regime and successional processes to begin to formulate the desired fu landscape/watershed condition. This step deals with scales potentially much larger then the waters or landscape area under analysis. For instance, fire history in the Coast Range my affect an area lar then the watershed being analyzed. When describing the landscape/watershed area key into the landsc elements (matrix, patches, corridors) and focus on the spatial pattern, the within patch variability pres in terms of structure as well as the variability between patches.

1. Disturbances and disturbance patterns:
   - Identify the "agents of change" that appear to drive the natural system.
   - Describe how human impacts has/may have changed or altered the natural rate disturbance.
2. Successional processes:
   - Describe how the area might have looked (in terms of landscape elements) witho human influences.
   - Describe how the watershed would look if natural succession is allowed to continue fro the current status forward in time (likely future condition in terms of landscape elements Use several different time frames here, eg 10 years, 50 years, and 100 years.

C. *How is the landscape area currently functioning and how is it suppose to function ??* The objective this step is to describe the interactions between the structural elements of the landscape and the agen of change as a way to characterize the mechanisms and functions of the ecosystem/watershed. At th point only the most important issues are forwarded for additional analysis. This methodology assume that the landscape pattern and structural elements directly effect the way the ecosystem functions and th if the structural elements and spatial pattern are represented in proper proportions that the ecosystem wi continue to properly function.

1. Describe existing condition of the key landscape elements/processes:
   - riparian corridors
   - stream channels
   - larger interior forest patches
   - human influences (quarries, rec sites, communications sites, powerline buildings/structures, farmland/agricultural areas, etc)
2. Are these keys elements functioning properly ?? What is the current condition ??

SYNTHESIS:

The objective of this phase is to synthesize the information from the landscape/watershed analysis portion and describ the current/existing condition in terms of spatial landscape patterns within the watershed/landscape analysis area.

The methodology suggested involves a stratification process where the watershed/landscape area is stratified into smalle components/areas (strata) that are like or similar based upon landform, structural characteristics, patch size/age, agent of change, frequency/duration/return rate of disturbance or change, and the interactions. Remember, only thos source conditions/issues that drive the system or appear to be the most critical are analyzed at this step. Thi ves to focus the analysis for the planning/design step. Two products are generated from this step: maps of th stratified landscape/watershed area and a narrative description of each strata within the watershed. Also, a feedback loo

1. Narrative
Describe the strata/categories of land which emerge from the systhesis in terms of:
- existing structure of the strata,
- seral stage,
- streams/aquatic systems,
- the proportion of that strata within the overall watershed/landscape area; strata to strata variation
- mix and proportion of structural elements within each strata; within patch variability,
- the range of capabilities of each strata,
- the range of natural conditions for each strata and the historical range and proportion,
- the current/existing conditon of each strata relative to the range of natural/historic conditions.

2. Maps
A map showing the spatial distribution of each strata within the landscape/watershed area. This is the end prod of this step but it may take several different maps or layers to generate this map. Examples might include curre seral stages, landslide susceptibility, streams categorized by condition/function, fire history map, and vegetati structure (snags, multiple canopy layered stands, etc). Any maps produced as "intermediate products" shou be saved and kept for possible use in the future.

3. Feedback Loop
It may be necessary to recycle thru the analysis steps if the mechanisms originally identified as critical are analyzed at the proper landscape scale or the critical mechanisms were not properly identified at the start. T is reflected in the ability to stratify the watershed/landscape area into subdivisions of the area that appear to meaningful and offer utility in designing the future target landscape.

PLANNING & DESIGN:

The objective of this phase is to design the target landscape and to refine the strata identified in the synthesis phase. T step utilizes the information and maps developed in the synthesis phase to identify the criteria, elements, flows, process and interactions that can further define and focus the future target landscape in terms of spatial orientation and str structure.

Three major criteria are expected to further define the target landscape; external linkages to other wateshcds/landsca areas, legal and existing land use allocations, and management constraints/public concerns.

1. External Landscape/watershed Linkages
These linkages are physical/biological as well as legal/social.
   A. Physical and biological resources.
      1. Describe how the watershed/landscape area under analysis is related to surrounding watershe and landscapes. Are there resource conditions that exist in adjacent areas that overlap into t watershed ?? For example DCA's that include only a part of the landscape/watershed. Are th landscape elements/processes in effect at a larger scale that define/dictate uses or managem actions in the specific watershed ?? For example sedimentation from above stream areas o dam located outside the watershed.
      2. These linkages need to be analyzed and defined in the same terms and context of the resou conditions developed in the synthesis phase; landform, structural characteristics, patch size/a agents of change, and the frequency/duration/return rate of disturbance or change agent.
   B. Social and legal linkages.
      1. Describe how the watershed/landscape area is related to surrounding communities. Are th municiple water supplies located within the area or downstream ?? Is there a large amount private timber land or agricultural land within the area ??

ATTACHMENT 1-5

2. Land Allocations and Legal Constraints
Review, map, and describe the watershed/landscape area in terms of the land use allocations and manage objectives (Key watersheds, AMA's, LSR's, matrix, etc) from FEMAT, Draft SEIS, the BLM's PRMP pro

Management Issues and Public Concerns *(Step 3, part 2 from BLM Info Bulletin No. OR-93-478).* Identify and incorporate local management issues and begin preliminary efforts to solicite public input.

4. Target Landscape Design
The objective of this step is to develop the elements, spatial orientation and distribution, and structures tha necessary for the future landscape/watershed area to properly function. Two products are envisioned; a narra and maps. *(Step 3, part 3 from BLM Info Bulletin No. OR-93-478).*

   A. Narrative. Describe the desired future condition or the target landscape. This is done using the s criteria and strata from the synthesis phase.
      1. Describe for the target landscape the range of natural conditions for each strata and the ta landscape as a whole
      2. Describe the landscape elements and spatial distribution of these within the target landscape
      3. Describe the following for each strata and the target landscape:
         - desired structure,
         - seral stage distribution; spatially and over time,
         - stream/aquatic sytems and condition,
         - the future proportion of each strata within the overall watershed,
         - the range of capabilities,
         - the mix and proportion of structural elements,
         - patch characteristics.
   B. Map(s) The maps may be either a single map or a series of maps that depict the futu landscape/watershed at various points in the future. The management opportunities/actions taken various points in time can also be displayed on the same series of maps.
   C. Identify data gaps and/or future data/inventory needs for analysis *(Step 3, part 6 from BLM Info Bulle No. OR-93-478).*

5. Management Opportunities. Identify various landscape level management opportunities for moving the landsca towards the desired future condition or target landscape. Potential projects in general locaations within t watershed/landscape area are identified and developed. *(Step 3, part 5 from Info Bulletin No. OR-93-478).*

6. Specific Projects Recommended
   A. Utilizing the potential projects recommended and refine into specific projects.
   B. Prioritize these projects for implementation
   C. Develop standards and guidelines for implementation *(Step 3, part 4 from Info Bulletin No. OR-93-478*
   D. Develop proposed action ID Team and NEPA compliance.
   E. Develop proposed implementation time frames *(Step 3, part 6 from Info Bulletin No. OR-93-478).*

PROJECT EVALUATION & IMPLEMENTATION: for BLM Primarily

1. If a Landscape analysis indicates that the proposed management action is of low risk, or is not likely to cause significant conflict with other resources, the proposed action may proceed in accordance with approved NEP guidelines. An environmental assessment or categorical exclusion must be prepared.

If Landscape analysis indicates that proposed management actions are likely to cause significant resource conflicts a Level II landscape/watershed analysis must be completed prior to implementing the proposed action.

3:w.

District ______________________ **Resource Area(s)** ______________________

1. **Watershed Name** ______________________

2. **Hydrologic Unit Code + Analytical Watershed Code Number (17- character alpha-numeric codes) Reference I.B. OR-93-605 dated August 25, 1993**

____

3. **Gross analysis watershed area (square miles)** ______________________

4. **Approximate BLM area in Watershed (square Miles)** ______________________

5. **What FEMAT land classifications are included in this watershed--e.g., late succession reserve, riparian reserve, key watershed matrix-- identify in approximate %:**

____

____

____

6. **What FY94/95 activities are proposed in this watershed, e.g., Jobs in the Woods, restoration, low risk timber sales? (Give a brief description of planned activities)**

____

____

____

____

____

7. **What are the key issues in the watershed and adjacent lands?**

____

____

____

8. **Who are current and potential cooperators?**

____

____

____

9. **Who are the Resource Area(s) contacts for this analysis?**

____

10. **Who is the District contact for this Watershed Analysis?**

____

ATTACHMENT 2

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
Oregon State Office
P.O. Box 2965 (1300 N.E. 44th Ave.)
Portland, Oregon 97208

In Reply Refer to:
7200 (932)

November 23, 1993

Information Bulletin No. OR-94- 106

To: DSDs, Staff and Branch Chiefs, DMS: Salem, Eugene, Roseburg, Medford, Coos Bay, Lakeview, Burns, Prineville, Spokane, Vale

From: State Director

Subject: Watershed Based Landscape-level Analysis for FY 1994

This memorandum corrects and replaces Information Bulletin OR-94-081 and supplements Information Bulletins OR-93-478 and 605 and is intended to help answer some of the questions that surround this topic and to clarify our current direction concerning watershed based landscape-level analysis workloads for FY 1994.

First, we want to reassure you that our initial procedures, as outlined in Information Bulletins OR-93-478 and 605, are still relevant. Districts are making good progress on these initial analyses, and effective interaction is occurring with adjoining Districts and National Forests. You should continue this activity and move forward to develop initial analyses using the criteria listed below for selecting priority areas. Attached is a sample interagency document, jointly developed by the Eugene and Salem Districts and the Siuslaw and Willamette National Forests, that incorporates the process outlined in our Information Bulletins and that meets Forest Service needs (see attachment 1 to OR-94-081). Other field units should find this example to be useful.

Second, we want to clarify the direction in the PAWP advices that required Districts to complete watershed analyses on one-third of the land area this fiscal year. That direction was intended to parallel Forest Service guidance and convey the magnitude of effort expected on this workload, but it is no longer a requirement.

You should focus instead on the following criteria for selecting areas for watershed based landscape-level analysis (it may be less than one-third of the total land, so long as a cross-section of all the priority areas get done) :

- **Key watersheds and riparian reserves in common with the Forest Service, where salmon restoration activities are planned.**

- Key watersheds and riparian reserves outside common Forest Service land areas, where salmon restoration activities are planned.

- Areas where restoration activities other than salmon restoration are planned for jobs in the woods program.

- Areas where, based upon existing information, timber sales, silvicultural demonstration projects and other activities could occur without precluding future options (i.e. in the GFMA and outside critical habitat, AMAs, and Key watersheds).

You should know that Conference Report language in the Interior Appropriations Bill gives us the flexibility to reprogram dollars in order to complete watershed analysis. Instruction Memorandum OR-94-061 provides a general idea of what you might expect in the final AWP advices. Given the emphasis placed on watershed analysis by Congress and the President's forest plan alternatives, we would expect each western Oregon District to dedicate about $1 million, including overhead, for watershed analysis in FY 1994.

Given the Congressional emphasis and the direction contained and reaffirmed in this memorandum, each District is to develop an action plan that identifies those areas where you intend to focus your initial watershed/landscape analysis for FY 1994. To assist you we have attached a form we would like completed and returned to DSD, Lands and Renewable Resources by December 6, 1993 (see attachment 2 to OR-94-081). A separate form should be completed for each watershed being analyzed. This information will be valuable to other Districts, OSO staff, and the interagency teams as we jointly pursue FY 1994 activities.

Third, you should be aware that there are a number of other committees and groups working on various aspects of watershed analysis. Most of these are part of nineteen different interagency groups working on various aspects of the President's forest plan for the Pacific Northwest. Some District employees are valuable members of these teams, and we appreciate their contribution. Each of these groups is trying to help bring common direction and methodologies to field units. This includes teams that are:

- digitizing watershed information on the GIS system

- developing selected chapters for a watershed analysis handbook

- developing interim guidance for FY 1994 watershed analysis

- developing common data elements and standards

As you know we began to develop our landscape analysis process before the Forest Conference was held and the FEMAT process began. Early on we determined that landscape/watershed analyses are important tools in an ecosystem-based approach. Our work with the interagency teams allows us to develop a process that will apply more effectively to multiple ownership areas and will help transition from initial watershed/landscape analysis efforts for FY 1994 to the analytical process used in subsequent years under any Forest Plan decision.

As further information is developed, it will be sent to field units. For example, we expect to issue interagency watershed/landscape analysis guidance on an interim process once the Final Supplemental EIS Record of Decision is complete. This guidance should not be inconsistent with your current direction, but should build on that foundation. Part of that direction may include developing 8-10 pilot watershed/landscape analyses throughout western Oregon and Washington to test procedures. We are thinking about different physiographic areas that would involve BLM, Forest Service, and other landowners as appropriate. Examples might include the Rogue Basin and the Applegate partnership area, the Portland municipal watershed, the Little River adaptive management area, and the Nestucca watershed. Each District can expect work in some area of joint importance to other landowners, and which focuses on priority resource issues.

A watershed handbook is also expected to be released about when the ROD is done. The handbook will ultimately contain a number of sections which focus on all dimensions of a watershed- based landscape analysis process, although most will not be completed when the handbook is first released. The first version will focus primarily on physical characteristics of stream channels, with limited additional sections on aquatic resources. We expect interagency teams to develop the remaining chapters over the next one to two years. Once complete, the handbook will provide the principal guidance for preparing detailed watershed/landscape analyses. This further demonstrates the need for both interim direction and a transition period for logical development of the watershed/landscape-level analysis processes.

Your continuing efforts to perform quality work on this important subject is appreciated. We remain committed to developing an orderly, reasonable process that will meet our objectives. We all need to recognize that this process is evolving, so there will be questions and details that we cannot yet answer. Several of you have already shared some of your concerns. It is important for members of the western Oregon Landscape Analysis Study Team to understand and discuss with others emerging issues/concerns/problems that develop as we work through this process.

It is also important for field units to share results with one another, so that we may learn from each other, and avoid recurrent problems. Should you have additional questions, please contact Bob Alverts at 280-7357, or Bill Brookes at 280-7054.

Robert J Rivers

Robert J. Rivers
Associate State Director
Acting

Distribution
WO-200 (Room 5650, MIB) - 1
SC-213 - 1
OR-930 - 1
OR-932 - 1
Western Oregon Management Team - 6

APPENDIX B

Definition of Terms Used in Table 1

APPENDIX B

DEFINITIONS OF TERMS IN TABLE 1

Water Resource Regions and Subregions: U.S. Geological Survey (USGS) terms referring to the aggregations of hydrologic units in river basins.

Hydrologic Unit: USGS hydrologic area used to delineate distinct watersheds within river basins.

Analytical Watershed: For BLM Resource Management Planning purposes, a drainage basin subdivision of hydrologic units used for analyzing the cumulative impacts on water resources.

Landscape Analysis Unit (LAU): A functional concept used to describe an operating area ranging from a single subwatershed to an analytical watershed. It is the ecosystem unit upon which landscape patterns will be analyzed. These areas will typically be 5,000 to 50,000 acres in size (not an absolute range).

Subwatershed: A hydrologic subbasin within a LAU. It is the minimum size unit needed for hydrologic cumulative effects analysis. It cannot be larger than a LAU and will often range from a few hundred to around 5,000 acres in size. Also referred to as a "compartment" in some BLM Districts.

Stand-OI Unit (Ecological Site): For data collection purposes, a land area which delineates ecological site-level information. For forested landscapes on BLM-administered lands, the ecological site level is a forest stand, and stand level information has been collected under the term "Operations Inventory" (or OI).

Landscape: "...a heterogeneous land area composed of a cluster of interacting ecosystems that is repeated in similar form throughout." For Pacific Northwest forests, this translates to areas drained by major streams, within which climate regime, geomorphic processes, and natural vegetation patterns are fairly uniform. It is the building block of biotic provinces and regions. (Forman and Godron, 1986; and Diaz and Apostle, 1992).

APPENDIX C

Element and Flow Matrix for Landscape Analysis Units (LAUs)

APPENDIX C

UPPER COW CREEK LAU
ELEMENT MATRIX

	PLANT COMMUN	HABITAT TYPE	PATCH SIZE	CORRIDORS	SERAL STAGE	SS PLANTS	SS ANIMALS	PROGENY SITE	NOXIOUS WEEDS	ANIMALS	SOIL TYPE	GEOLOGY	ECA	COMPACTION	ROAD DENSITY	PHYSICAL ATTR	MINERALS	OWNERSHIP	IMPOUNDMENTS	QUARRIES	PEOPLE
PLANT COMMUNITY	X	X	X	X	X	X	X		X	X				?							X
HABITAT TYPE	X	X		X	?	X	X		X	X			?	?							X
PATCH SIZE	X	?	X	X		X	X		X	X			X						?		X
CORRIDORS	X	X	X	X	X	X	X		X	X			X	X	X						X
SERAL STAGE	X	X	X	X	X	X	X		X	X			X	?							X
S.S. PLANTS	X	X		?	?	X														?	X
S.S. ANIMALS		X	X	X	X		X			X			?		X				?	?	X
PROGENY SITES	X	X		X	X	?		X	X	X			X								X
NOXIOUS WEEDS	X	X		X	?	X			X												X
ANIMALS	?					X	X			X				X							X
SOIL TYPE	X	X				X			X		X			X	X	?	X				X
GEOLOGY	X	X				X			X		X	X				?	X			X	X
ECA	X	X	X	X	X	?	?		X	X			X	?	?	?					X
COMPACTION	X	X									?			X		X					X
ROAD DENSITY		X		X		?	X		X		X		X	X	X	X					X
PHYSICAL ATTRI	X	X		X					?	X	X					X			X		X
MINERALS	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
OWNERSHIP	X	X	X	X	X	X	X		X	X			X	X	X	?	X	X	X		X
IMPOUNDMENTS	X	X	X	X	X	X	X		X	X	X		X					X	X		X
QUARRIES	X	X	X	X	X	X	X		X	X	X		X		X	X	X	X		X	X
PEOPLE	X	X	X	X	X	X	X	X	X	X			X	X	X		X	X	X	X	X

APPENDIX C

UPPER COW CREEK LAU
FLOW MATRIX

	AIR	STREAMS	RAIN	SMOKE	FIRE	ANIMALS	BIRDS	PEOPLE												
AIR																				
STREAMS																				
RAIN																				
SMOKE																				
FIRE																				
ANIMALS																				
BIRDS																				
PEOPLE																				

APPENDIX D

Watershed CPL Instructions
Prepared by Salem District

APPENDIX D

Watershed CPL Instructions
Prepared by Salem District

WATERSHED CPLS / WATERSHED ANALYSIS

These CPLs will use a study area map that you create (generally through selecting a grouping of subwatersheds and saving them to a map name consisting of an 8 character or less MAP ID and _AWS). Your map will be used as a template to identify and display data existing in GIS that is located within your study area. Display maps are created at a scale of 1:31680 or 2"/mile for consistent application between study areas.

Several limitations exist with the use of these cpls:

-Run only using EMU-TEK emulation software.

-Due to the consistent scale of the output maps at 2"/mile, study areas may exceed the plotters capability to plot the map. The pen plotters on the Salem District are limited to 39 inches in the north to south direction. (By running MAPTEST.CPL -- the first step in the batch RUNH2OANALYSIS.CPL -- you can test the size and content of your selected study area map.) If the size is larger than can be accommodated by this cpl try to reselect the subwatersheds comprising the map to make a better fit.

-The data received is limited to what is currently in GIS, such as TPCC, Wetland data and Stand Ages limited to BLM lands within the watersheds. Data such as roads, gross vegetation and streams are primarily limited to WODDB townships. That means that study areas which go beyond these townships will have incomplete coverage.

-Errors within data themes will require careful review of data within some of the resulting maps and length and area tables. (ie... the fish theme in some areas show incomplete coverage for fish use. One noted problem is the apparent stocking of "flying fish" or disconnected coverages. Another problem noted in some areas is the lack of complete resident fish data -- generally resident fish occur wherever there are also anadromous fisheries. This may or may not be the case as far as the data is concerned in the GIS database. The cpl identifies the length of stream occupied by resident trout as a separate entity from a length of stream occupied by anadromous fisheries -- thus under normal conditions the stream which contains both resident and anadromous fisheries will be identified twice (once for each).)

These cpls consist of two parts. The first portion creates the work maps and area & length tables (ex. BASEMAP.CPL) the second portion creates the PENPLOT plot file (ex. BASEMAPPLOT.CPL). Since this is the case, work maps can be run first, used or edited and then have the PENPLOT files made at a later date.

The set of Watershed Analysis cpl's is currently stored in AHRENDT>WATERSHEDCPLS and should be copied into your origin point before starting the cpl. Since updates and corrections occur in this directory, periodic copying of this directory is necessary to maintain a current set of cpl's.:

```
        OR
        COPY AHRENDT>WATERSHEDCPLS
        Y
```

These cpls can be run in batch mode or as individual maps by typing in the name of the cpl. <u>To run in batch mode use the **RUNH2OANALYSIS.CPL.**</u>

You need to first create a map which contains the subwatersheds or areas you wish to study. This is generally done by going to your MOSS area and selecting by subjects or item numbers the subwatersheds you wish to make up your landscape study area. SAVE this active table to a map called XXXXXXXX_AWS (MAP ID up to 8 characters followed by _AWS). This needs to be in your MOSS area in order to run the cpl.

The first map run is MAPTEST which will create a TEST map of the selected watersheds. Use this map to ensure that you have the correct watersheds and that it will fit on the plotter (check by paging up to read the .LOG file that is displayed over the TEST map.

If the map size and content is good -- proceed with the remainder of the cpl's by responding with a "Y". "N" will place you back in PRIMOS at your control prompt.

First the "batch" cpl will create the work maps and area&length tables in your MOSS area. It will then ask if you want the plot files. If you want the finished plot maps respond with a "Y". "N" will place you back in PRIMOS ready to use/edit the work maps and tables.

All display maps, work maps and length&area tables are made and left in your MOSS user area.

If you were not watching the DSC_SHOW of each map as it was being created use the CHECKMAPS.CPL to check and ensure that they are good maps. (for some reason a high percentage of maps done with this cpl do not DSC_SHOW. <u>Do Not</u> send a map that doesn't show to the plotter -- it bombs and jams the plotter.) The CHECKMAPS.CPL will do a DSC_SHOW on all of the maps created in the batch watershed analysis cpl. It asks you if the plot is a good one "Y/N". Use the EMU_TEK ALT--E keys to erase graphics (hit return twice). The "bad" maps are renamed as x.xxxx instead of m.xxxx and listed at the end of the cpl as "bad" maps. To "fix" these maps rerun one at a time by typing in the individual cpl name followed by plot such as PLSMAPPLOT or BASEMAPPLOT (see list of cpls). If a large number of maps need to be remade use RUNH2OANALYSISTRY2.CPL to remake all of the maps. This step is relatively fast since the "TRY2" cpl uses only the cpls used for making the actual plot file using the previously made work maps to recreate the display maps.

When the maps have been checked and remade where needed move the map files to ZETA>WATERSHEDANAL by typing :

```
-MOVE M.(MAP ID)@@@.INIT    ZETA>WATERSHEDANAL>= =
-MOVE AREA&LENGTH_(MAP ID)  ZETA>WATERSHEDANAL>= =
```

Clean up User Area -- delete work maps and .log files that you do not wish to keep for further analysis. (Note -- space is limited on the PRIME so keep your User areas to a minimum of files needed for current projects. Long term storage of data can be transferred to tape for later use.)

Once your user area is cleaned up attach to ZETA>WATERSHEDANAL and send the maps you want to the plotter:

```
-AT   ZETA>WATERSHEDANAL
```

-Use MAPPLOT.CPL (Salem Plotter) or TILMAPPLOT.CPL (Tillamook plotter) to send the full set of maps created in the watershed analysis batch run to the plotter. This normally allows the maps to be plotted in a continuous roll to make handling and display easier.

Individual maps can be sent to the plotter :

```
-MOSSPLOT M.(MAP_NAME).(INIT) -Q 1 (sends to the Salem Plotter)
-MOSSPLOT M.(MAP_NAME).(INIT) -Q 3 (sends to the Tillamook Plotter)
```

Maps stored in ZETA>WATERSHEDANAL may periodicly be copied to tape for long term storage and then delete from disk. This will allow for better control of disk space. If a certain set of maps needs to be kept available be sure to inform the GIS shop.

There are times when you can't afford to keep the terminal tied up with running the batch cpl in interactive mode (running at night, Tillamook due to problems with phone line surges). The batch run of these cpls can be done through the use of a phantom. The RUNPHANTOM.CPL was created for this. In order to use this cpl you must use EMACS to edit the input (assign) portion of the cpl:

-type ET RUNPHANTOM.CPL (to enter the EMACS editor)
-change the response assignments in the cpl:

```
-&s map :=  XXXXXXXX        {map id}
-&s init :=  XXX      {your initials}
-&s ra1  :=   XXXXXXXX      {name of R. A. containing study area}
-&s ra2  :=  XXXXXXXX       {if study area overlaps 2 R.A's. name of 2nd}
                             {if none leave blank}
-&s yn   :=       X    { Y/N -- yes/no -- do you want plot files for final
                         maps?}
```

-save changes with the F1 key.
-end EMACS with the ESC key followed by the SHIFT--F1 keys.

Next run the RUNPHANTOM.CPL as a phantom:

-type PH RUNPHANTOM

You can monitor the activity of the phantom be watching for the appearance of the related .COMO files in the WATERSHEDCPLS directory and by SLISTing the .COMO (example --SLIST BASEMAP.COMO). (Be sure to run the CHECKMAPS.CPL whenever you use the phantom to run the cpls.)

The following are a list of cpls used for watershed analysis currently available and used in the batch run of **RUNH2OANALYSIS.CPL:**

MAPTEST.CPL

This plots the selected study area to check for content and size of plot. This step also copies the NULL.{POLY/LINE/POINT} maps from ZETA>MOSSA to your work area.

Maps Used / Displayed:

-%MAP%_AWS	Selected Watersheds comprising study area.
-ZETA>MOSSA>NULL.POLY	Null polygon map.(location outside of Salem District)
-ZETA>MOSSA>NULL.LINE	Null line map.(location outside of Salem District)
-ZETA>MOSSA>NULL.POINT	Null point map.(location outside of Salem District)

BASEMAP.CPL / BASEMAPPLOT.CPL

This plots and labels the subwatersheds within the study area along with the PLS, BLM lands, Resource Area boundaries, Oregon USGS quad boundaries and reference numbers, and the 5 point inventory plots with reference numbers.

Maps Used / Displayed:

-%MAP%_AWS	Selected Watersheds comprising study area.
-SALEM_PER	Salem District map containing township perimeters.
-SALEM_PLS	Salem District map containing PLS.
-SALEMOWN	Salem District map of all BLM ownership (SU = PD!OC)
-SALEMRAB	Salem District map of Resource Area boundaries.

-OR_QUADS	Oregon USGS quads (SU = reference #'s)
-SALEM5PTMUB	Salem District 5 point inventory plots by Master Unit (SU = master unit & reference #.)
-NULL.POLY	Null polygon map for use as a placeholder during PENPLOT.

Work Maps Created:

-%MAP%_5PT	5pt. inventory plots within the study area by watershed and master unit.

Area & Length Tables Created:

-%MAP%_AWS.A	Acres by watershed within the Study area.
-%MAP%_OWN.A	Acres by watershed of BLM administered lands within the study area.

PLSMAPPLOT.CPL

This plots and labels the subwatersheds within the study area along with the PLS and Township perimeters.

Maps Used / Displayed:

-%MAP%_AWS	Selected Watersheds comprising study area.
-SALEM_PER	Salem District map containing township perimeters.
-SALEM_PLS	Salem District map containing PLS.

Work Maps Created: None

Area & Length Tables Created: None

FOIMAP.CPL / FOIMAPPLOT.CPL

This plots and labels the subwatersheds within the study area along with FOI age bands (0 - 39, 40 - 79, 80 - 192 and 193 plus -- based on birthdate (DK) and the year 1993).

Maps Used / Displayed:

-%MAP%_AWS	Selected Watersheds comprising study area.
-SALEMF0_39	Salem District map of stand ages between 0 & 39.
-SALEMF40_79	Salem District map of stand ages between 40&79.
-SALEMF80_192	Salem District map of stand ages between 80 & 192.
-SALEMF193PLUS	Salem District map of stand ages 193 and older.
-NULL.POLY	

Work Maps Created:

-%MAP%_F0_39	FOI maps by birthdate by watershed within the Study Area grouped by stand age ranges.
-%MAP%_F40_79	" "
-%MAP%_F80_192	" "
-%MAP%_F193PLUS	" "

Area & Length Tables Created:

-%MAP%_F0_.A	Acres of FOI 0 - 39 stand age by watershed w/in the study area.
-%MAP%_F40_.A	Acres of FOI 40 - 79 stand age by watershed w/in the study area.
-%MAP%_F80_.A	Acres of FOI 80 - 192 stand age by watershed w/in the study area.
-%MAP%_F193.A	Acres of FOI 193 and older stand age by watershed w/in the study area.

HYDMAP.CPL / HYDMAPPLOT.CPL

This plots and labels the subwatersheds within the study area along with the streams by stream order, lakes and municipal watersheds. (two maps -- one with BLM reach #'s and one without)

Maps Used / Displayed:

-%MAP%_AWS	Selected Watersheds comprising study area.
-HYDROALSEA	Resource Area merged maps of Township Hydro Themes with Subject = BLMREACHNO.
-HYDROYAMHILL	
-HYDROTILLAMOOK	
-HYDROCLACKAMAS	
-HYDROSANTIAM	
-SALEMLAKES	Salem District map of merged LAK Theme.
-SALEMMWS	Salem District map of Municipal Watersheds.
-NULL.LINE	
-NULL.POLY	

Work Maps Created:

-%MAP%_HYD	Study area map of streams by watershed & order (SU = BLMREACHNO).
-%MAP%_LAKES	Lakes within the study area by watershed.

Area & Length Tables Created:

-%MAP%_HYD.L	Miles of streams by streamorder and watershed in study area.
-%MAP%_LAKES.A	Acres of lakes by watershed in the study area.

TRBMAP.CPL / TRBMAPPLOT.CPL

This plots and labels the subwatersheds within the study area along with roads by control (BLM, other government, and private).

Maps Used / Displayed:

-%MAP%_AWS	Selected Watersheds comprising study area.
-TRBALSEA -TRBYAMHILL -TRBTILLAMOOK -TRBCLACKAMAS -TRBSANTIAM	Resource Area maps of merged township TRB maps with the subject = CONTROL (edited to show BLM/GVT/PVT).
-SALEMHWYS	Salem District Map of Major Roads & Highways (for display purposes.)

Work Maps Created:

-%MAP%_TRB	Study area map of roads by watershed by control.

Area & Length Tables Created:

-%MAP%_TRB.L	Miles of roads by control by watershed in the study area.

LUAMAP.CPL / LUAMAPPLOT.CPL

This plots and labels the subwatersheds within the study area along with the land use allocations identified under the preferred alternative (P2).

Maps Used / Displayed:

-%MAP%_AWS	Selected Watersheds comprising study area.
-SALEM_LUA	Salem district map of land use allocations based on the preferred alternative (P2).
-NULL.POLY	

Work Maps Created:

-%MAP%_LUA	Study area map of land use allocations from the preferred (P2) alternative. (incl... diversity blocks / deferred OGEA's / GFMA's / NON-DIFFERED OGEA's / RPA'S)

Area & Length Tables Created:

-%MAP%_LUA.A	Acres in the study area by watershed and land use allocation.

FISHMAP.CPL / FISHMAPPLOT.CPL

This plots and labels the subwatersheds within the study area along with the streams with anadromous and resident fisheries.

Maps Used / Displayed:

-%MAP%_AWS	Selected Watersheds comprising study area.
-SALEMFISH	Salem district map of BSEARCHed FSH theme township maps with subject equal to ANAD or RESI. Streams with both are represented twice, once for each.

Work Maps Created:

-%MAP%_FISH	Study area map of stream reaches by watershed by Anadromous and Resident fisheries.

Area & Length Tables Created:

-%MAP%_FISH	Miles of stream by ANAD & RESI and by watershed in the study area.

OUTSMAP.CPL / OUTSMAPPLOT.CPL

This plots and labels the subwatersheds within the study area along with the areas out of the timber base (TPCC: Non-Forest, Fragile Non-Suitable Woodlands, Suitable Woodlands, and Recreation Outs : Developed Recreation Areas, ACEC's).

Maps Used / Displayed:

-%MAP%_AWS	Selected Watersheds comprising study area.
-SALEMNON_FOR	Salem district map of Non_Forest Areas (TPCC)
-SALEMF_NW	Salem district map of Fragile Non-Suitable Woodlands (TPCC)
-SALEMR_W	Salem district map of Suitable Woodlands (TPCC)
-SALESINRECP2	Salem district (P2) recreation area's & ACEC's

Work Maps Created:

-%MAP%_NONFOR	Non-Forest areas in study area by watershed.
-%MAP%_F_NW	Non-Suitable Woodlands in study area by watershed.
-%MAP%_R_W	Suitable Woodlands in study area by watershed.
-%MAP%_REC	Recreation areas / ACEC's / etc. by watershed

Area & Length Tables Created:

-%MAP%_NONFOR.A	Acres of Non-Forest areas in study area by watershed.
-%MAP%_F_NW.A	Acres of Non-Suitable Woodlands in study area by watershed.
-%MAP%_R_W.A	Acres of Suitable Woodlands in study area by watershed.

-%MAP%_REC.A	Acres of Recreation areas / ACEC's / etc. by watershed

WETLANDMAP.CPL / WETLANDMAPPLOT.CPL

This plots and labels the subwatersheds within the study area along with the areas of surface water, permanent high water tables, seasonal high water tables and non-forest grass areas due to shallow rooting over high water tables.

Maps Used / Displayed:

-%MAP%_AWS	Selected Watersheds comprising study area.
-SALEMFWNW	Salem district map of all TPCC FWNW (Non-Suitable woodlands due to permanent high water tables.)
-SALEMFWR	Salem District map of all TPCC Fragile-Restricted due to seasonal high water tables. (FWR1, FWR2)
-SALEMNGWET	Salem district map of all Non-Forest Grass (TPCC : NG) areas that are a result of restricted rooting depth due to high water tables. (generally old pond areas filling in and going to sedges and grasses.)
-SALEMNW	Salem district map of all Non-Forest water (TPCC: NW) (i.e. ponds, lakes and other surface water).
-NULL.POLY	

Work Maps Created:

-%MAP%_FWNW	Map of permanent high water tables (TPCC: FWNW) in by watershed in study area.
-%MAP%_FWR	Map of seasonally high water tables (TPCC: FWR1, FWR2) by watershed in the study area.
-%MAP%_NGWET	Map of Non-Forest Grass due to high water

	tables by watershed in the study area.
-%MAP%_NW	Map of surface water by watershed in the study area.

Area & Length Tables Created:

-%MAP%_FWNW.A	Acres of permanent high water tables (TPCC: FWNW) in by watershed in study area.
-%MAP%_FWR.A	Acres of seasonally high water tables (TPCC: FWR1, FWR2) by watershed in the study area.
-%MAP%_NGWET.A	Acres of Non-Forest Grass due to high water tables by watershed in the study area.
-%MAP%_NW.A	Acres of surface water by watershed in the study area.

GVGMAP.CPL / GVGMAPPLOT.CPL

This plots and labels the subwatersheds within the study area along with the Gross Vegetation mapped on WODDB townships in the GVG theme.

Maps Used / Displayed:

-%MAP%_AWS	Selected Watersheds comprising study area.
-SALEMGVG	Salem District map of Gross Veg. theme (SU = Veg. Codes)

Work Maps Created:

-%MAP%GVG	Gross Vegetation by watershed in the study area.

Area & Length Tables Created:

-%MAP%GVG.A	Acres by Gross Vegetation type by watershed located in the study area.

SLSMAP.CPL / SLSMAPPLOT.CPL

This plots and labels the subwatersheds within the study area along with the General Soils Associations from the SCS General Soils map. The map is split and labeled by soil association and color coded by soil moisture and temperature regime.

Maps Used / Displayed:

-%MAP%_AWS	Selected Watersheds comprising study area.
-SALEMSLS	General Soils map of the Salem District.

Work Maps Created:

-%MAP%_SLS	Study area map of General soils by watershed.

Area & Length Tables Created:

-%MAP%_SLS.A	Acres by general soils association by watershed located in the study area.

RTUMAP.CPL / RTUMAPPLOT.CPL

This plots and labels the subwatersheds within the study area along with the potential timber harvest units and potential roads identified in the 10 year scenario for the preferred alternative (P2). The harvest units are color coded by harvest type (ie... suspension levels, tractor / cable, etc.). The roads are identified by their proposed surfacing type (ie...dirt / gravel / paved).

Maps Used / Displayed:

-%MAP%_AWS	Selected Watersheds comprising study area.

-SALEMRTRSURF	Salem district map of potential (10 year scenario) roads. (Su = proposed surface type)
-SALEMRTULOG	Salem district map of potential (10 year scenario) timber sale units. (Su = proposed logging type)

Work Maps Created:

-%MAP%_RTR	Map of potential roads by proposed surfacing by watershed located within the study area.
-%MAP%_RTU	Map of proposed timber sale units by watershed in the study area.

Area & Length Tables Created:

-%MAP%_RTR.L	Miles of potential roads by proposed surfacing by watershed located within the study area.
-%MAP%_RTU.A	Acres of proposed units by watershed in the study area.

OPT9MAPPLOT.CPL

This plots and labels the subwatersheds within the study area along with the FEMAT Option 9 land use allocations and the Key (Tier 1) watersheds.

Maps Used / Displayed:

-%MAP%_AWS	Selected Watersheds comprising study area.
-SALEMOWN	Salem district map of BLM administered lands.
-SALE_OPT9_NEW	Salem district map of FEMAT Opt9 land use allocations. (from OSO)
-SALE_BLMKWS	Salem district map of FEMAT Key (Tier 1) watersheds. (from OSO)

-SALEM_PER	Salem district map of township perimeters.
-SALEM_PLS	Salem district map of the PLS grid.

Work Maps Created: None

Area & Length Tables Created: None

DCAMAP.CPL / DCAMAPPLOT.CPL

This plots and labels the subwatersheds within the study area along with the proposed DCA's used for the preferred (P2) alternative. {this map is no longer in the batch listing -- however it can be run as a separate map if wanted.}

Maps Used / Displayed:

-%MAP%_AWS	Selected Watersheds comprising study area.
-SALE_DCA4	Salem district map of proposed DCA's.

Work Maps Created:

-%MAP%_DCA	DCA's by watershed in study area.

Area & Length Tables Created:

-%MAP%_DCA.A	Acres of DCA's by watershed located in study area.

CHECKMAPS.CPL

This cpl will do a DSC_SHOW on all of the maps created by the batch watershed CPL.

If you are not doing them all, edit the file through EMACS by typing:
-ET CHECKMAPS.CPL
-type a /* in front of the maps you are not using.
-save by pressing the F1 key.
-escape by pressing ESC followed by SHIFT F1 keys.

The CPL will ask you if it is a good map? (Y = good) In other words, did the DSC_SHOW work -- if not type N this will rename the map with an X. instead of an M.. Use EMU-TEK ALT E to erase graphics between map shows.

If only a few maps are "bad" redo the PENPLOT file by typing in the specific map nameplot (ie... BASEMAPPLOT, HYDMAPPLOT, etc.) to rerun the specific plot file. If a lot of them are "bad", rerun the entire batch of maps by using RUNH2OANALYSISTRY2. (Hint: To speed typing use RUNH TAB T TAB and let the machine do the spelling.)

BUILDING DISTRICT MAPS

The following set of CPL's was used to build the district and resource area sized maps used by the watershed CPL. This set of cpls opens each respective directory (SHARED, ALSEA, YAMHILL, TILLAMOOK, CLACKAMAS, SANTIAM) and performs a specific action such as BSEARCH on a given theme and/or perform UTILITY/ATT2SUB to replace the subject with an attribute for each township in the directory. These township maps are then merged to create Resource Area maps of the altered themes. The SHARED township data may be cut on the Alsea R.A. boundary.

BSEARCH.CPL	Batch run of district to BSEARCH and merge a theme from a given BSEARCH string.
BSEARCH_%RA%.CPL	(Where %RA% = SHAR, ALSE, YAMH, TILL, CLAK, SANT). This cpl BSEARCHs each township in the respective directory and creates new township maps.
ATT2SUB.CPL	Batch run of district to use the UTILITY / ATT2SUB command to replace the subject with an attribute on a specified theme and merge them into a new Resource Area map.
ATT2SUB_%RA%.CPL	(Where %RA% = SHAR, ALSE, YAMH, TILL, CLAK, SANT). This cpl uses the UTILITY / ATT2SUB command to replace the subject with an attribute for each township in the respective directory and creates new township maps.
BSEARCH_ATT2SUB.CPL	Batch run of district to BSEARCH on a given search string and use the UTILITY / ATT2SUB command to replace the subject with a specified attribute and merge them into a new Resource Area map.
BSEARCH_A_%RA%.CPL	(Where %RA% = SHAR, ALSE, YAMH, TILL, CLAK, SANT). This cpl will BSEARCH on a given search string and use the UTILITY / ATT2SUB command to replace the subject with an attribute for each township in the respective directory and creates new

	township maps.
MERGE_BSEARCH_%RA%	(Where %RA% = SHAR, ALSE, YAMH, TILL, CLAK, SANT). This cpl merges the township maps created in the earlier cpls and merges them into project area maps. The township maps are then deleted within the cpl.
CUTBSEARCHPOLY.CPL	This cpl will take the specified merged map of a SHARED theme and cut it on the Alsea Resource Area boundary.(Polygon map)
CUTBSEARCHLINE.CPL	This cpl will take the specified merged map of a SHARED theme and cut it on the Alsea Resource Area boundary.(Line map)

The following maps and their current locations were used in the Watershed Analysis CPLs:

%MAP%_AWS	Map of watersheds comprising the study area. (Needs to be created and located in your MOSS area.) {Usually created by selecting a set of watersheds from -SWB (Subwatershed maps)}
ZETA>MOSSA>NULL.POLY	Polygon map used as place holder for PENPLOTS.
ZETA>MOSSA>NULL.LINE	Line map used as place holder for PENPLOTS.
ZETA>MOSSA>NULL.POINT	Point maps used as place holder for PENPLOTS.
OPERATIONS>SALEM_PER	Salem district map of township perimeters {Merge of all Township PER & XPE maps.}
OPERATIONS>SALEMOWN	Salem district map of PLS grids. {merge of all township PLS & XLS maps.}
OPERATIONS >SALEMRAB	Salem district map of Resource Area boundaries.
OPERATIONS>OR_QUADS	Oregon USGS quads (SU = reference #'s)
OPERATIONS>SALEM5PTMUB	Salem district 5 point inventory plots by master unit. {MERGEd 5pt township maps & OVERLAYed with Master Unit boundaries.}
OPERATIONS>SALEMF0_39	Salem district map of FOI with DK(birthdate) showing the stand age to be between 0 & 39 (base date 1993). {BSEARCH & ATT2SUB of township FOI & XOI maps using search string : DK GE 1954 AND DK LE 1993 OR DK EQ 0}
OPERATIONS>SALEMF40_79	Salem district map of FOI with DK(birthdate) showing the stand age to be between 40 & 79 (base date 1993). {BSEARCH & ATT2SUB of township FOI & XOI maps using search string : DK GE 1914 AND DK LE 1953}
OPERATIONS>SALEMF80_192	Salem district map of FOI with DK(birthdate) showing the stand age to be between 80 & 192

(base date 1993).

{BSEARCH & ATT2SUB of township FOI & XOI maps using search string : DK GE 1801 AND DK LE 1913}

OPERATIONS>SALEMF193PLUS Salem district map of FOI with DK(birthdate) showing the stand age to be over 193(DK = 1800) (base date 1993).

{BSEARCH & ATT2SUB of township FOI & XOI maps using search string : DK GE 10 AND DK LE 1800}

OPERATIONS>HYDROALSEA Alsea Resource Area merged maps of hydro themes (SU = BLMREACHNO).

{ATT2SUB of Township HYD and XHY maps}

OPERATIONS>HYDROYAMHILL Yamhill Resource Area merged maps of hydro themes (SU = BLMREACHNO).

OPERATIONS>HYDROTILLAMOOK Tillamook Resource Area merged maps of hydro themes (SU = BLMREACHNO).

OPERATIONS>HYDROCLACKAMAS Clackamas Resource Area merged maps of hydro themes (SU = BLMREACHNO).

OPERATIONS>HYDROSANTIAM Santiam Resource Area merged maps of hydro themes (SU = BLMREACHNO).

OPERATIONS>SALEMMWS Salem district map of Municipal Watersheds.{RMP map}

OPERATIONS>TRBALSEA Alsea Resource area merged maps of TRB themes (roads)

{ATT2SUB SU = CONTROL & then edited to BLM/GVT/PVT).

OPERATIONS>TRBYAMHILL Yamhill Resource area merged maps of TRB themes (roads)

{ATT2SUB SU = CONTROL & then edited to BLM/GVT/PVT).

OPERATIONS>TRBTILLAMOOK Tillamook Resource area merged maps of TRB themes (roads)

{ATT2SUB SU = CONTROL & then edited to BLM/GVT/PVT).

OPERATIONS>TRBCLACKAMAS Clackamas Resource area merged maps of TRB themes (roads)
{ATT2SUB SU = CONTROL & then edited to BLM/GVT/PVT).

OPERATIONS>TRBSANTIAM Santiam Resource area merged maps of TRB themes (roads)
{ATT2SUB SU = CONTROL & then edited to BLM/GVT/PVT).

OPERATIONS>SALEMHWYS Salem district map of major roads & highways (display).

OPERATIONS>SALEM_LUA Salem district map of land use allocations (Preferred Alternative (P2)).

OPERATIONS>SALEMFISH Salem district map of BSEARCHed FSH themes. (BSEARCHed for Anadromous fisheries SU = ANAD) (BSEARCHed for Resident fisheries SU = RESI) (Maps MERGEd SU = RESI / ANAD) (Streams with both resident and anadromous fisheries are represented twice (once for each)).
{search := COHO GT 0 OR CHINOOK GT 0 OR STEELHEAD GT 0 OR , }
{search2 := CUTTHROAT GT 0 AND CUTTHROAT NE 2} {ATT2SUB SU = COHO then use UTILITY / SUBEDIT to rename all subjects to ANAD}

{search:= CUTTHROAT GT 1 OR RAINBOW GT 0} {ATT2SUB SU = RAINBOW then use UTILITY / SUBEDIT to rename all subjects to RESI.}

SALEMP2_LIB>SALEMNON_FOR Salem district map of Non-Forest areas (TPCC)
{BSEARCH & ATT2SUB TPC & XTP maps [search := XH^ EQ Y] [SU = SY^]}

SALEMP2_LIB>SALEMF_NW Salem district map of Fragile Non-Suitable Woodlands (TPCC).
{BSEARCH & ATT2SUB TPC & XTP maps [search :=VG^ EQ F AND VL^ EQ NW OR , BT^ EQ F AND BD^ EQ NW] [SU = SY^]}

SALEMP2_LIB>SALEMR_W Salem district map of Suitable Woodlands (TPCC).
{BSEARCH & ATT2SUB TPC & XTP maps [search := VG^ EQ R AND VL^ EQ W OR , BT^ EQ R AND BD^ EQ W] [SU = SY^]}

SALEMP2_LIB>SALESINRECP2 Salem district (P2) Recreation areas / ACECs.

SALEMP2_LIB>SALEMFWNW Salem district map of all TPCC FWNW (Non-Suitable Woodlands due to permanent high water tables.)

{BSEARCH & ATT2SUB TPC & XTP maps [search := VG^ EQ F AND (WO^ EQ W OR EG^ EQ W) AND VL^ EQ NW OR ,] [search2 := BT^ EQ F AND (BP^ EQ W OR EH^ EQ W) AND BD^ EQ NW] [SU = SY^]}

SALEMP2_LIB>SALEMFWR Salem district map of all TPCC Fragile Restricted due to seasonal high water tables. (FWR1, FWR2)

{BSEARCH & ATT2SUB TPC & XTP maps [search := VG^ EQ F AND (WO^ EQ W OR EG^ EQ W) AND VL^ EQ R OR ,] [search2 := BT^ EQ F AND (BP^ EQ W OR EH^ EQ W) AND BD^ EQ R AND VR^ EQ N] [SU = SY^]}

SALEMP2_LIB>SALEMNGWET Salem district map of all Non-Forest Grass areas that are a result of restricted rooting depth due to high water tables. (TPCC).

{BSEARCH & ATT2SUB TPC & XTP maps [search := VG^ EQ NG] File edited to include only those polygons that are due to shallow rooting over water(usually aged lakes & ponds) [SU = SY^]}

SALEMP2_LIB>SALEMNW Salem district map of all Non-Forest Water (TPCC = NW) (Surface water)

{BSEARCH & ATT2SUB TPC & XTP maps [search := VG^ EQ NW] [SU = SY^]}

OPERATIONS>SALEMGVG Salem district map of gross vegetation theme. (SU = Veg. Codes)

{SEL \NULL township maps GVG & MERGE}

OPERATIONS>SALEMSLS General soils map of the Salem district (SCS).

{Western Oregon General Soils map OVERLAYed with the Salem District boundary.}

OPERATIONS>SALEMRTRSURF Salem district map of potential (10 year scenario) roads by proposed surfacing type.

{ATT2SUB RTR & XRR maps [SU = SURFACE]}

OPERATIONS>SALEMRTULOG Salem district map of potential (10 year scenario) timber salem units by proposed logging method.

{ATT2SUB RTU & XRU maps [SU = LOGGING]}

DISTRICT>SALE_OPT9_NEW FEMAT Opt9 map (LUA's) (Reserves / AMA's) Salem district map. {from OSO}

DISTRICT>SALE_BLMKWS	FEMAT Opt9 Key Tier 1 watersheds -- District map. {from OSO}
SALEMP2_LIB>SALE_DCA4	Salem district DCA's (P2){from OSO}

ROAD_REPORT.CPL

This creates reports on roads within the watershed by township. It gives a report listing the subject, length(attributed length), twp, rge, sec, seg, control, sur-type, surf-depth, sub-width, close-stat, close-type. It also creates a length table by subject of actual miles within the watersheds. These tables can then be PRIMELINKed and added to a LOTUS or dBase table for further processing. {this map is not in the batch listing -- however it can be run as a separate cpl if wanted.}

Maps Used / Displayed:

-%MAP%_AWS	Selected Watersheds comprising study area.
-%TWP%NTRB	QC3 TRB

Work Maps Created:

-none

Area & Length Tables Created:

-%TWP%ROAD.R	Report of road segments within the Study Area.
-%TWP%ROAD.L	Length table of road segments within the Study Area.

APPENDIX E

Testing the SNAP II Model in the Buncom Subwatershed From Ashland Resource Area, Medford District

EXECUTIVE SUMMARY

COVERING PROCEDURAL REQUIREMENTS FOR SNAP II DATA ASSEMBLAGES ON BUNCOM SIZED PROJECTS (12,000 ACRES, SMALL SUB-WATERSHEDS < 1000 POLGONS)

TIME FRAMES, SKILL LEVEL REQUIREMENTS AND MODEL LIMITATIONS

The SNAP II Model through the attached process (see pages 5-10) can provide a limited level of landscape display information (assessments) and spatial/temporal analysis. By projecting seral stage developments in the landscape, the associated impacts to wildlife resources can be modeled over time within the user interface that SNAP II provides. The provision of timber commodities can be adjusted to levels of acceptable impacts which are used by managers to better depict PSQ. This is done by including knowledge of the spatial and temporal requirements of other resources present in a landscape that are linked to seral stage development and arrangement.

One feature of SNAP II that this data extraction process does not facilitate fully is the economic feasibility of extracting the timber resource. A more refined and detailed economic feasibility analysis was preferred but not included in this process because of the enormous amount of additional data required to provide product values and associated costs. Only the minimum amount of data required to run an analysis which projected seral stage developments was used.

Managers should recognize the required numbers of skilled employees necessary to implement this kind of process. The tendency for management is to expect all the required skills to be possessed by each employee, but the reality here is that the types of programs and associated platforms are far to complex for employees to possesses all the skills necessary, nor have high levels of proficiency. The attached tabular information describing the process may help further depict the required commitments for managers if they adopt this approach.

04/08/94 Addendum: It should be recognized that SNAP II has no known abilities to analyze landscape impacts other than timber harvest and road developments. SNAP II's "westside focus" will not directly address other land management activities which might impact the resource base (wildlife, fisheries, etc.). It was not designed to analyze conditions or activities like wildfire, mass landscape failures, pit or large scale surface mining, recreational developments (skii areas and campground constructions) and other non-timber site disturbing or landscape affecting operations.

PROCESS TABLE

SNAP II Data Extraction, Assemblage and Model Operation Procedural Steps	Required Systems/ Hardware and Software	District Proficient Skill Pool Level	Proficient User's Time Frame	Unskilled User's Time Frame
MOSS File (ADS*) Assemblages (data inter-sections and exports)	PRIME/PRIMOS CPL PRIME/MOSS/ADS	6 people	1-2 days	5-10 days
LTPLUS Unit & Link Edits (BLM)	UNIX/LTPLUS	2 people	4-5 days	10-15 days
Private Data Assemblage from Aerial Photos	NONE	50+ people	2-3 days	4-5 days
LTPLUS Unit & Link Scanning & Edits (Private)	UNIX/LTPLUS DOS/LDSCAN	2 people	2-3 days	4-5 days
MICRO*STORMS Attribute selection and Assemblages	REV./R-BASIC	2 people	1 day	10 days
Private Attribute Assemblages	NONE	50+ people	5 days	10 days
SNAP II Editors Data Assemblages and One Complete Analysis Run	DOS/SNAP II	1 person	5 days	10 days
		Totals -->	20-24 days	53-65 days

ADDITIONAL REQUIREMENTS AND INFORMATION NEEDS TO BE CONSIDERED BY ANALYSIS STUDY TEAM AND MANAGERS

PROGRAM ENHANCEMENTS AND DEVELOPMENTS NEEDS:

A. Research and add an internal model, from current available sources, that can analyze changes in seral stages or vegetative characteristics of the landscape and produce indices which predict fire hazard rating and associated indices for prediction of fire events and potential effect on landscape.

B. Research and add an internal model which predicts changes in demographic (human populations) arrangements over time in a particular landscape to provide an assessment of projected difficulties in implementation of various ecosystem projects. It should work on predicting population growth and concentrations within landscapes and help to provide factors to other models that use information predicting fire hazard, recreational use, commodity requirements, etc.

C. Work with Bob McGaughey and other such PNW programmers and software developers to write a program which can take coordinate information in SNAP II ASC input files and read them into ARC/INFO or some processing environment, mate them with a digital terrain model, extrapolate a z-coordinate and re-write the SNAP II ASC input files with changes in place. NOTE: Discussions with Bob McGaughey have shown that with a management directive, budget dollars and about one-week he could provide this service.

D. Follow-up on the current enhancements being developed by federal govt. (F.S. & BLM), state govt. and private interests and determine if this will become available to us in the future (i.e. Weyerhauser and 10,000 polygon enhancement).

E. Determine if with minor programming alterations the current program structure suited to detailed level data inputs and tactical planning approaches can provide strategical applications through attachments to only parts of the assembled data. Just because the model's algorithyms rely heavily on economic data from timber values and associated logging, road and other costs to rank units for their feasibilty selection, it does not mean with some alternate programming approach we could not find ways to use either other economic associations (like est. values of other resources) or a more simple set of economic functions which take less input data and manipulations.

F. Develop process for data extraction from ARC/INFO environments and relational databases or MICRO*STORMS like databases. If the future data sources may be derived from Satellite Imagery and then brought into ARC/INFO this will again surface the need for a new process for data transfer.

G. The need to produce enhancements in hardcopy displays greater than 8.5"X 11" can be dealt with through creative programming and display features.

H. Last note here is that SNAP II provides an amazing ability to interface timber commodity economics, wildlife population dynamics, hydrological flows and any other model which is driven on the changes of vegetation over time inrelation to the affected resource. Its program interface though complex in its provision of choices is really user friendly and an excellent example of our needs for landscape analysis.

SNAP II INPUT DATA
EXTRACTION SOURCES AND PROCEDURES
FOR BLM LANDS

I. UNIT & LINK (GIS/MOSS, O.I. POLYGONS AND ROADS, X,Y COORDINATES)

SOURCE: THE UNITS & LINKS (BLM POLYGONS AND ROADS) DATA WERE OBTAINED FROM THE GIS/MOSS FILES ON THE PRIME COMPUTER. THE NFOI 1992 UPDATE FILE WAS CHOSEN AS THE DATA SOURCE.

PROCEDURE:

1. To provide unit data (polygons) for the Buncom Project a Project Area Outline or defined landscape/watershed perimeter was constructed in MOSS and then overlaid with the 1992 NFOI theme.

2. To provide road data (links) for the Buncom Project the above procedure was followed using the TRB theme.

3. To transfer the data extracted from MOSS a PRIMOS CPL (LTP, author Bryden) was written which prompted user for the appropriate files and then put these files into export format including changing to state plane feet coordinate projection and providing for additional input information (map heights and widths, cell size heights and widths, etc.) to be used later in LTPLUS.

4. The last procedure in this part of the data extraction processes was performed with the PRIME to UNIX file transfer utility or ETHERNET. This allowed transfer to the LTPLUS Program running on the (SCO) UNIX Workstation for further required file manipulation.

ADDITIONAL NOTES ON ABOVE PROCEDURES:

1. 1992 NFOI and TRB thematic layers were identified form the GIS as the only appropriate layers for the processes due to the use of associated MICRO*STORMS data files from the 1992 updates. Operational bases would not provide up to date information for both coordinate (GIS) and unit attribute information obtainable only through MICRO*STORMS.

2. In MOSS after NFOI was overlaid with the landscape/watershed perimeter the SIZE command was used to eliminate small sliver units of less than one acre in size.

3. The attachment of a Z-Coordinate value was researched to provide elevational perspectives to the model however though the GIS data has DEM's (Digital Elevation Models) which provides for topographic depictions, there are no routines written to take files (like SNAP II unit polygon files, X,Y Coordinates) and compare them to DEM's and then extract a equivalent Z which is then attached to the SNAP II unit polygon file. Conversations with GIS and Software developing arms of the PNW Laboratories have provided estimates from a couple of days to one week to program a routine that could provide for this enhancement feature.

II. UNIT ATTRIBUTES (SERAL STAGES, UNIT VOLUMES, TREE SPECIES, ETC.)

SOURCE: THE UNIT ATTRIBUTES FOR BLM OWNERSHIP WERE DERIVED FROM THE MICRO*STORMS DATABASE, SPECIFICALLY THE 1992 NFOI UPDATE.

PROCEDURE:

1. An R-BASIC (Revelation Program) routine written by John McGlothlin took the unit label (names) information for each polygon (derived from LTPLUS attribute file output) and matched them with associated MICRO*STORMS O.I. key number fields.

2. The routine searched the MICRO*STORMS SITE file and using various fields of information like age-class, dominant species, unit volumes, etc. produced SNAP II codes for inputs like seral stage, species and unit volume (for each associated polygon from the original LTPLUS unit attribute SNAP II export file).

ADDITIONAL NOTES ON ABOVE PROCEDURES:

1. Assumptions for data transformation were developed to provide the minimum level of data input required to run a SNAP II analysis. It was recognized that additional assumptions and/or searches of the data set could have produced different data transformation and additional data elements. The procedure can be modified to attain more attributes for SNAP II input.

2. No road attribute information was transferred for SNAP II inputs through this process. However it was determined non-essential for purposes of this analysis and what roads information used was assembled during data manipulations in LTPLUS.

GIS DATA
RECONFIGURATION AND TRANSFORMATION PROCEDURES
(USE OF LTPLUS)

UNITS & LINKS (POLYGONS & ROADS)

A. GIS data from MOSS was imported into the LTPLUS program and rasterized for ease of manipulation. The geodesics were registered and referenced to the projection system (State Plane) used in the LTP routine written by Bruce Bryden.

B. Map cell heights and widths were manually set from outputs of the LTP routine and therefore created parameters for rasterized formats.

C. In rasterized format the polygon and road data's were edited to eliminate data errors and provide necessary formats required for SNAP II data inputs.

1. All polygon islands were eliminated as required by the SNAP II manual by providing connections between islands and surrounding polygons. No specific patterns were adopted for the connection except where it was evident that a terrain feature or vegetative type existed.

2. After a re-assemblage and export of polygon data into SNAP II format from LTPLUS, the stick file formats were found to have potential flaws. The stick file formation routines for LTPLUS, on severely amoebic shaped units, produced units graphically unrecognizable in the SNAP graphical stick formats. To eliminate this problem for now all such units were divided into parts and given alpha suffixes to their six digit key number subject label ID's.

3. All polygons attached to the project area perimeter and of minimal acreage (< 2 acres) were aggregated with adjacent polygons or eliminated for purposes of this analysis.

4. Roads from the GIS TRB layer were edited to eliminate skid roads and roads known to be abandoned or closed. Roads not within the landscape perimeter, but required to provide network paths for forest products and commodities were selected for depiction.

5. Two or more road labels as they exist in the MOSS thematic layer TRB can occupy the same node or coordinate value. This comes from the digitization process which defines each road as a segment having beginning and ending road nodes and labels. The existence of this will confuse the SNAP II analysis and therefore must be removed. Road labels were stripped from the original TRB file and through group labeling process in LTPLUS are relabeled starting with 1 and proceeding forward adding 1 each time until all nodes are renamed sequentially with numerical attributes.

SNAP II INPUT DATA
EXTRACTION SOURCES AND PROCEDURES
FOR PRIVATE AND NON-BLM LANDS

I. UNIT & LINK (AERIAL PHOTOS, GIS/MOSS, ROADS, X,Y COORDINATES)

SOURCE: THE UNITS & LINKS (PRIVATE AND NON-BLM POLYGONS AND ROADS) DATA WERE OBTAINED FROM THE MULTIPLE SOURCES. AERIAL PHOTOS COVERED UNITS AND THE GIS/MOSS THEMATIC TRB LAYER COVERED ROADS.

PROCEDURE:

1. To provide unit data (polygons) for the Buncom Project on Private Lands procedures adopted for the BLM lands as described in Section I.,1. were used. After the outline of the defined landscape/watershed was constructed in MOSS and then overlaid with the 1992 NFOI theme, the map was subject selected for polygons with private attributes. The private attribute map was then penplotted.

2. A penplotted map was produced by use of professional knowledge and information derived from Aerial Photography. This penplot map was then scanned and imported into the LTPLUS program. The map registrations was gained from tick mark points on the penplot and registration knowledge of these points from plotted coordinates.

2. The road data (links) for the Buncom Project on Private Lands the were assumed to represented by the TRB layer used in development of BLM data.

II. UNIT ATTRIBUTES (SERAL STAGES, UNIT VOLUMES, TREE SPECIES, ETC.)

SOURCE: THE UNIT ATTRIBUTES FOR PRIVATE OWNERSHIP WERE DERIVED FROM ASSEMBLAGES OF FIELD AND PHOTO REFERENCED DATA.

PROCEDURE:

1. Attributes for the forest types from the Aerial Photography were transferred into SNAP II by using the graphical editors in the program. This data included age-class determinations which produced some seral stages for forest types. Some seral stages representing hardwood/woodland, brush and interior valley grass types were similarly transferred.

2. The attribute for unit species and volume on forest types were derived from cruise estimates and field tally. If field visitation was impractical or otherwise unattainable photo estimates where made. The data was input similar to the seral stage information.

APPENDIX F

Draft Watershed Analysis From Glendale Resource Area, Medford District

A Preliminary Analysis

# of the

Rogue Frontal West

Landscape Analysis Unit

Glendale Resource Area

Medford BLM

Phase 1

Draft **Draft** **Draft**

(Not completed)

Landscape Analysis Team Members
Steve Timmons
Marty Ellis
Jim Badger
Forest Perkins
Roger Schnoes

3-9-94

ROGUE FRONTAL WEST 3-9-94
Landscape Analysis Unit

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DRAFT ROGUE FRONTAL WEST 3-9-94 DRAFT

ROGUE FRONTAL WEST
Landscape Analysis Unit

I. Summary

To be completed Later

II. Introduction

The Rogue Frontal West Landscape Analysis Unit LAU is located in southwest Oregon approximately 26 miles northwest of Grants Pass on the north side of the Rogue River (Map 1). This unit is comprised of approximately 36,339 acres in the Rogue River watershed. BLM administers 33,829 acres (93 percent) and the Siskiyou National Forest administers 178 acres (0.5 percent); leaving 2332 acres (6 percent) in private ownership.

Major tributaries include Kelsey Creek, Quail Creek, Ditch Creek and Mule Creek. The unit has been divided into 12 watershed compartments for analysis, including three areas of frontal drainages with small creeks draining directly into the Rogue River (Map 2). These compartments range from about 374 acres to about 8527 acres.

The data used for this report are contained in GIS maps, in Rogue Frontal West files maintained in the Resource Area and community files also maintained in the Resource Area.

III. ANALYTICAL UNIT DESCRIPTION - Landscape elements, flows, relationships.

A. Landscape elements

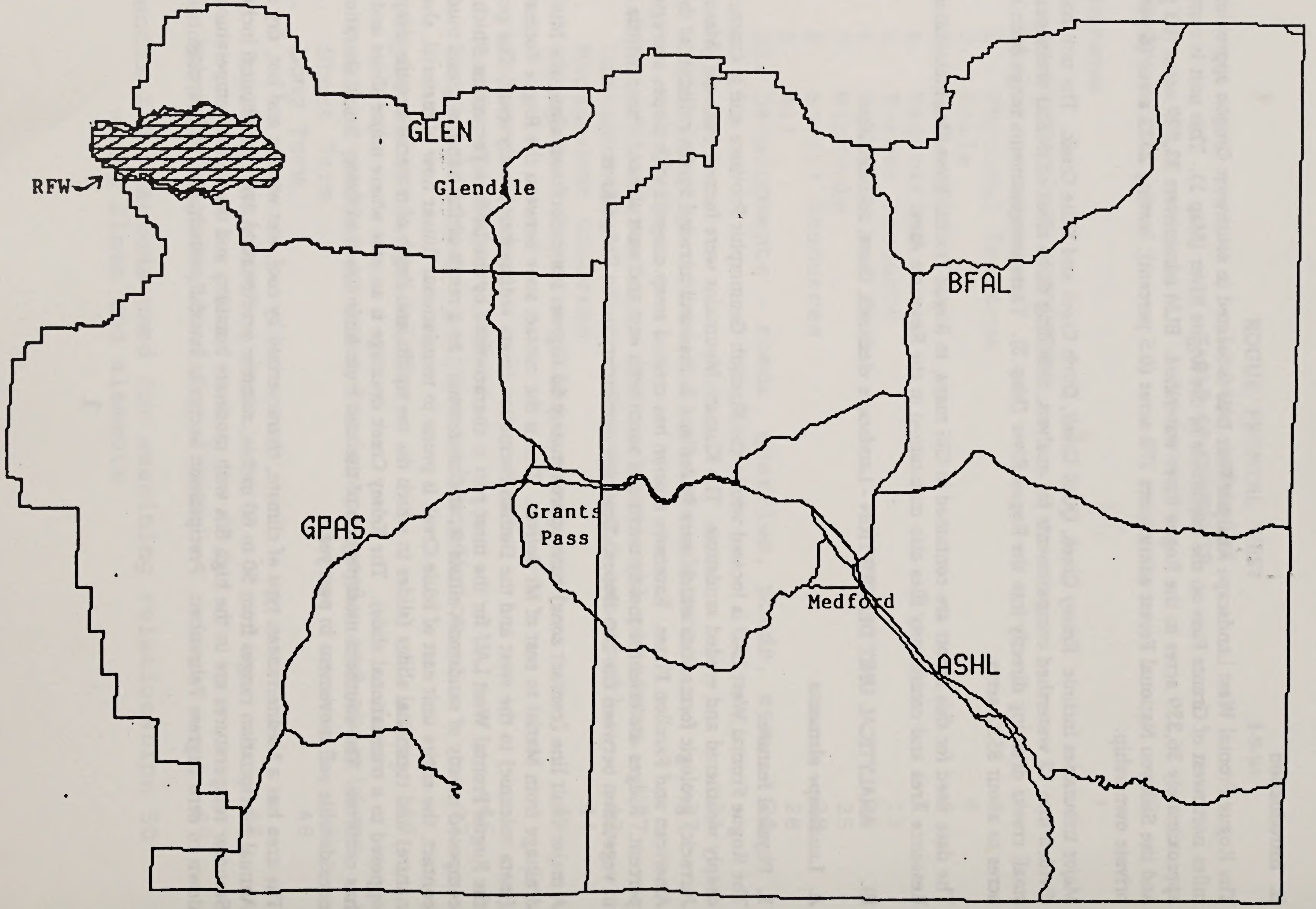
1. Physical features

The Rogue Frontal West LAU is located within the Klamath Geomorphic Province and is characterized by deeply weathered and eroded sandstone. The Klamath Mountains were formed from old (Mesozoic-Jurracic) geologic formations which were folded and faulted and intruded by the collision of the North American and Farallon Plates. Extensive erosion has created steep canyons with slopes averaging 50-55 percent. Ridges are oriented mostly north and south with east and west slopes. There is little variation in vegetation between the two slopes. Drainage is tributary to the Rouge River.

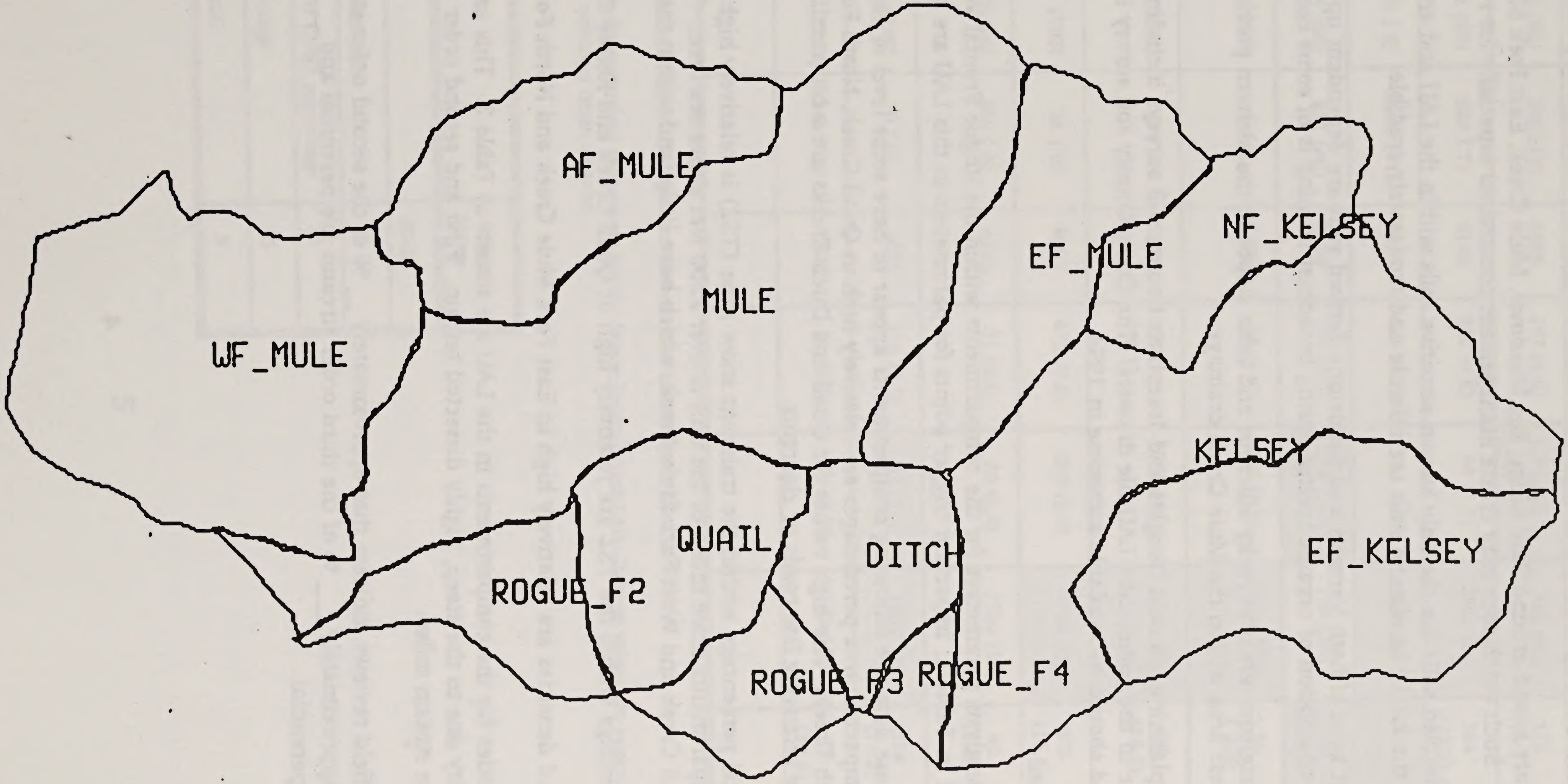
A major fault line (contact zone) runs approximately 68 degrees north-northeast along the Mule Creek drainage from Marial to east of Mt Bolivar. This is the contact zone between the Rogue Formation (meta volcanic) to the west and the Dothan Formation (meta sedimentary) to the east. The geology of the Rogue Frontal West LAU for the most part is characterized by the Dothan Formation which is composed mostly of sandstone, siltstone, and mudstone. As a result of this sand, silt, and mudstone contact, the entire unit east of Mule Creek is prone to translational (linear flow of material, shallow in nature) and rotational slides (slides in which the toe uplifts and depth of material is quite deep as opposed to a translational slide). The Kelsey Creek drainage is an area where major slides and slumping has occurred. The southern most portion of the unit from Mule Creek to Kelsey Creek also shows considerable soil movement in past years.

The area has a Mediterranean type of climate, characterized by cool, wet winters and hot, dry summers. Annual precipitation ranges from 50 to 80 inches; summer precipitation averages about 6 inches. Summer temperatures are in the high 80s with moderate humidity and the winter temperatures can drop down to zero degrees Fahrenheit. Precipitation occurs in late fall, winter, and early spring.

Map 1. General location of the Rogue Frontal West Landscape Analysis Unit within the Medford District, BLM.



Map 2. Compartments within the Rogue Frontal West Landscape Analysis Unit.



2. Soils

Soils in the Rogue Frontal West LAU consist mainly of Beekman-Vermisa Complex and Josephine/Speaker Series. Vermisa soils are shallow soils, less than 20 inches, and found in conjunction with steep slopes and ridge tops. Due to the shallow nature of the soil rooting depth of plants is restricted. Josephine/Speaker soils are generally found on slopes less than 60%, and are relatively deep and well drained soils and more productive than the Beekman-Vermisa Complex.

Slide areas are found around Bald Ridge, Big Meadows, Mule Creek, East Fork Mule Creek, Kelsey Creek, and Marial. Such conditions may create management constraints especially for road construction.

Sandstone-derived soils are the only known sensitive soils within the LAU and are found on ridgetops throughout the LAU. Sandstone soils are infertile and moderately erodible.

The nutrient base of both Vermisa and Sandstone derived soils are dependent upon organic matter, therefore consumption of organic matter during broadcast burning is of some concern

There are extensive areas of rocky outcrops and talus slopes in the western portion of the unit, mostly in the wilderness area within the Mule Creek drainage.

For project planning, consult Douglas and Josephine County soil surveys including detailed maps which are available in the community LAU file drawers. The Curry County soil survey is in the process of being finalized and should be available sometime in 1994.

3. Watershed

Watershed analysis parameters for the compartments within the Rogue Frontal West LAU are summarized in Table 1; important trigger points for parameters in this LAU are summarized in Table 2.

Based on these data the following compartments appear to have some level of concern:

-Compacted area percentages are relatively high in Quail Creek, North Fork Kelsey Creek and Ditch Creek. The high values for Quail and Ditch Creeks are a bit puzzling since these areas have relatively few roads or clearcuts.

-Total percentage within the transient snow zone (TSZ) is relatively high in almost all compartments since much of the unit is over 2500 feet above sea level. The exceptions are Quail Creek and West Fork Mule Creek, which have little land within the TSZ.

-Openings within the TSZ are relatively high in Quail Creek and Kelsey Creek.

-Road densities are relatively high in East Fork Mule Creek and North Fork Kelsey Creek.

Stream densities for the compartments in the LAU are shown in Table 3. This unit has a relatively high stream density due to the steep, highly dissected terrain. First and second order streams comprise ____-___ % of the stream miles.

Preliminary field reviews indicate that approximately __ % of the second order streams in this unit are perennial. Approximately ___ % of the third order streams are perennial and ___ % of the fourth order streams are perennial.

Table 1. Watershed analysis summary for compartments in the Rogue Frontal West Landscape Analysis Unit.

Compart.	BLM Acres (%)	Non-BLM Acres (%)	Total Acres	ECA Acres (%)	Compacted Area (%)	Total TSZ Acres (%)	TSZ Openings Acres (%)	Road Density (mmi/mi2)
Ditch Cr	1353 (83)	280 (17)	1633	107 (6.6)	71 (4.3)	786 (48)	150 (19.1)	2.8
E Fk Kelsey	3863 (93)	282 (7)	4145	232 (5.6)	69 (1.7)	2833 (68)	364 (12.8)	1.7
Kelsey Cr	559 (9)	5518 (91)	6077	485 (8.0)	139 (2.3)	3542 (58)	752 (21.2)	3.1
Quail Cr	1194 (60)	811 (40)	2005	130 (6.5)	113 (5.6)	704 (35)	160 (22.8)	3.5
Arrasta Fk Mule Creek	3120 (100)	0 (0)	3120	54 (1.7)	15 (0.5)	1608 (52)	36 (2.2)	0.7
East Fork Mule Creek	3274 (100)	0 (0)	3274	329 (10.1)	101 (3.1)	2600 (79)	428 (16.5)	4.9
Mule Creek	8627 (100)	26 (0)	8653	672 (7.8)	204 (2.4)	3762 (43)	605 (16.1)	3.3
West Fork Mule Creek	4743 (96)	200 (4)	4943	31 (0.6)	20 (0.4)	1726 (35)	42 (2.4)	0.5
N Fk Kelsey	1651 (100)	0 (0)	1651	104 (6.3)	83 (5.0)	1528 (93)	218 (14.3)	4.4
Rogue Frontal	2382 (87)	344 (13)	2726	91 (3.4)	74 (2.7)	33 (1)	19 (57.6)	2.3
RFW LAU TOTALS								

Shading indicates areas of management concern based on trigger values in Table 2.

Table 2. Trigger values for watershed parameters for the Rogue Frontal West LAU. Trigger values are approximately those values at which management concerns begin to arise.

Watershed Parameter	Trigger Value
ECA percentage	20-25
Compacted Area percentage	5
Transient Snow Zone (TSZ) percentage	50
TSZ openings percentage	25
Road density (mi/mi2)	5

Table 3. Stream density for the Rogue Frontal West Landscape Analysis Unit.
LAU size: _______ acres

Order	BLM miles	Non-BLM miles	Total miles
1			
2			
3			
4			
5			
6			
7			
8			
9			

Table 4. Riparian condition for the Rogue Frontal West LAU.

Order	BLM Streams				Non-BLM Streams				All Streams			
1	P*	F*	G*	Tot*	P*	F*	G*	Tot*	P*	F*	G*	Tot*
2												
3												
4												
5												
6												
7												
8												
9												

* P = Poor F = Fair G = Good Tot = Total

Riparian condition is summarized in Table 4. Riparian condition is based on average tree size within the riparian zones of each stream order. Stream habitat condition (discussed in the Fish section) is based on the riparian condition, but also includes subjective evaluations of stream bank stability, amount of disturbance, influence of roads and other sources of sediments, total sediment loads, effects of sensitive soil areas and other factors. The major factors used in this LAU include stream bank stability and roads.

4. Vegetation

a. Vegetation Overview

Plant communities within the landscape unit are representative of the diversity encountered within the Klamath Mountains Province. The geologic and geographic features, in addition to climatic conditions, greatly influence the development of soils and vegetation. The mountainous terrain accentuates the landscape diversity. Extensive erosion has created steep canyons. Topographic features influence the natural disturbance patterns. Fire has disturbed the landscape frequently, and has played an extremely important role in the development of existing plant communities within the forests and meadows of the landscape unit. Within the last several decades, timber management activities have altered the landscape most drastically.

b. Plant Associations and Communities

A variety of plant communities and seral stages exist within the Rogue Frontal West unit. This diversity is present throughout the network of riparian communities, upland forests, meadows, and rocky sites, including rock cliffs and talus slopes. Plant associations are generally based on potential vegetation (climax species) and site characteristics. Plant association classification work has not been completed in the landscape unit. However, the draft RMP aggregated upland plant communities with similar characteristics into seven major plant community groupings. A plant community grouping is defined as an aggregation of plant associations with similar management potential, the same dominant late seral conifer species, and similar principle early seral species.

Rogue Frontal West is part of the Douglas-fir/tanoak-madrone grouping. This grouping is characterized by evergreen hardwoods and shrubs which resprout after disturbance, persist in the stand, and constitute a major part of the climax association. In the early seral stage, grass and forbs are sparse. The plant community is dominated by resprouting tanoak, madrone, chinquapin, or other evergreen hardwoods and shrubs. Varnishleaf ceanothus is locally dominant on wetter sites and canyon live oak is prevalent on dry sites. Conifer species of the late seral stage include Douglas-fir, white fir, sugar pine, ponderosa pine, incense cedar, western red cedar, western hemlock, Port-Orford cedar, and pacific yew. Understory vegetation in the late seral stage may include species mentioned earlier, as well as rhododendron and salal. Tree form tanoak may be the climax species and would dominate the mature and old growth stages if fire could be excluded.

Smaller vegetation communities associated with riparian areas, meadows, rock outcrops, rock cliffs, or talus slopes occur within the defined major plant grouping. Meadow habitat is very limited in distribution within the LAU. Sites dominated by rock are common within the wilderness area and the Rogue River canyon. Riparian areas are extensive throughout the unit. Special status plant species are most likely to occur in these unique ecosystems.

Forested riparian zones are generally more complex than adjoining plant communities. The diversity of vegetation spans from plants submerged in water to species common in upland plant communities. Annual and perennial plants and shrubs, as well as tree species mix, are likely to be more diverse than adjacent upland forests. A higher occurrence of bigleaf maple, red alder, willow, and vine maple is likely in riparian areas.

c. Matrix, Patches, and Corridors

Matrix

The matrix is defined as the most connected portion of the landscape, expressed in terms of vegetation cover. Differentiation of the upland forests can be categorized by seral stages or age classes. The draft Medford BLM RMP EIS described five seral stages for each major plant grouping: early seral, mid-seral, late seral, mature, and old growth/potential natural community. Acreages of age classes within the LAU are presented in Table 5. These seral stages are based on GIS age class distribution and do not take into account partial cutting and other modifications to stand structure.

The matrix of the Rogue Frontal West landscape is an older forest, a combination of both mature and old growth forests. Approximately 77 percent of BLM acres are 110+ years. Structure, species composition, and age distributions in the forest matrix varies from one part of the landscape to another, especially on opposing North/South aspects.

South slopes appear to experience a higher intensity of fire disturbance than north slopes. These fires often consume varying amounts of vegetation, creating various sized openings within the burned areas. Frequently the stand is not completely reset to the early seral stage. Instead, inclusions of younger aged trees, both conifers and hardwoods, create multiple canopy levels within a mosaic of structural features and seral elements. Remaining large conifers generally have a patchy distribution, compared to north slopes which often have a more continuous canopy of larger coniferous trees.

The forest matrix can be further differentiated by classifying the older forest stands according to structural and functional features. The primary variable affecting the classification of the older forests within the Rogue Frontal West landscape is the extent of partial cutting. Partial cut stands often lack the full range of structural and functional features found in stands without logging disturbance. For instance, partial cutting opens up the canopy, removes snags and down logs, removes hardwoods and can increase brush in the understory.

Table 5. Seral stage distribution for the Rogue Frontal West Landscape Analysis Unit (December, 1993).

Age Class or Type	BLM Lands					Private Land Acres (%)	Total LAU Acres (%)
	General Forest Matrix Acres (%)	LSR Acres (%)	Connec-tivity Acres (%)	Wild-erness Acres (%)	Total BLM Acres (%)		
Nonforest							
Roads							
AGE 0-9	1,222 (8.5)	540 (5.2)	48 (7.8)	0	1,810 (5.4)		
AGE 10-19	692 (4.8)	202 (2.0)	0	1 (0)	895 (2.7)		
AGE 20-49	2,763 (19.2)	508 (4.9)	138 (22.4)	37 (0.5)	3,446 (10.3)		
AGE 50-109	727 (5.1)	796 (7.7)	0	54 (0.7)	1,577 (4.7)		
AGE 110-199	2,759 (19.2)	4,974 (48.2)	0	6,477 (79.6)	14,210 (42.5)		
AGE 200 PLUS	6,192 (43.1)	3,289 (31.9)	429 (69.8)	1,569 (19.5)	11,479 (34.4)		
TOTAL	14,355	10,309	615	8,138	33,417		

Partial cutting was common in roaded areas of the LAU. A relatively light partial cut or salvage entry was a typical harvest practice, particularly in East Fork Kelsey Creek and Quail Creek drainages. In these stands approximately 1/3 of the volume and most of the large snags were removed in the 1970's. These stands are now dominated by large conifers with a single, undifferentiated understory layer of brush and conifer saplings. Heaver partial cuts, similar to a shelterwood harvest, occurred in East Fork Mule Creek, Mule Creek, and a few other places. These stands consist of very widely scattered overstory conifers with an understory varying from patches of conifer reproduction and brush, to a mixture of predominantly hardwood trees and brush with limited distribution of conifer seedlings and saplings.

Patches

Patches were created within the matrix of older forest through clearcutting beginning in the 1950s. A pattern of rectangular shaped openings connected by a network of roads has been created in Mule, East Fork Mule, North Fork Kelsey, and Ditch Creeks.
Naturally occurring patches also occur in the form of a few meadows, rock outcrops, talus slopes and brushfields. These occur primarily in the West Fork Mule Creek drainage, largely within the wilderness area and in the small Rogue River frontal basins. In addition, fire-induced patches within the matrix also frequently occur in unentered stands in Kelsey Creek, West Fork Mule Creek and the small frontal basins. The results of these fire disturbances created both fine-grained landscape detail associated with undercanopy fires, as well as blocks of even aged, Douglas-fir stands associated with catastrophic stand replacement fires. Within the LAU, naturally occurring late seral stage (age 50-109 years) Douglas-fir stands occur on approximately 5 percent of BLM acres

Corridors

Corridors are landscape elements which connect similar patches and usually have high contrast with the surrounding matrix or aggregation of patches. Corridors facilitate flow of materials or organisms and can be man-made or naturally occurring.

Man made corridors are manifested by the network of roads within the LAU.

Riparian zones are naturally occurring corridors. Within the East Fork Mule Creek and Mule Creek drainages, the forested riparian corridors provide connectivity for the fragmented blocks of older forest to the more intact older forests to the west.

Another significant natural corridor is the Rogue River Canyon which runs along the southern border of the LAU.

d. Important plant species

Port Orford Cedar is a very high value commercial species and is threatened with a root rot.

The bark of Pacific Yew contains taxol, which has been shown to be effective in treating some cancers. An interagency management plan has been developed for both these species.

Western red cedar is also considered to be an important species within this LAU due to its relative scarcity and the riparian areas in which it is found.

Sugar pine is a species of concern due to the prevalence of sugar pine blister rust. Very few seedling trees are surviving to maturity. The BLM has initiated a genetics program to develop rust-resistant strains of sugar pine.

e. Special status plants

Special Status Plants observed within the Glendale RA and known to occur within each LAU are shown in Table 6. The fact that a check mark does not occur does not mean that plants do not exist, just that they have not been observed. Most LAUs have a chance of having all species on the table with the exception of Bensoniella. The only inventories have been in the form of clearances for timber sales and other projects.

The two species which have been located within the LAU are Bensoniella oregani, associated with seeps and riparian areas; and Sedum moranii, associated with rock outcrops. Both species are candidates for listing under the federal Endangered Species Act.

A list of detailed locations has not been developed by species.

f. Test / Experimental / Demonstration areas

Research programs with test sites within the Rogue Frontal West unit include the Medford BLM district's tree improvement program and the Forestry Intensified Research Program (FIR).
In the 1970's, numerous Douglas-fir trees thought to be genetically superior in volume growth and form (based on phenotypic characteristics) were selected and identified. Each tree was tagged and painted. Glendale Resource Area records show locations of 110 Douglas-fir "plus trees" in Rogue Frontal West unit. In subsequent years, cones were collected from these trees. One of the purposes of these cone collections was to provide seed for progeny tests to evaluate the genetic value of selected parent trees.

Three progeny test sites were established in the L.A.U. in 1986 and 1987:

Name	Year Planted	Location
Ana Plot	1987	T.32S.,R.9W., SE1/4 SW1/4 Sec. 8 T.32S.,R.9W., NE1/4 NW1/4 Sec. 17
Arrasta Plot	1986	T.32S.,R.9W., SE1/4 NW1/4 Sec. 30
Big Meadows	1986	T.33S.,R.10W., NW1/4 NW1/4 Sec. 1 T.33S.,R.10W., NE1/4 NE1/4 Sec. 2

Seedlings planted at the progeny test sites are measured at regular intervals, usually every five years. The progeny measurement data is analyzed, and the selected parent trees are then ranked in order of desirability as sources of improved seed and for grafting in district seed orchards.

One Douglas-fir field orchard was planted in T.33S.,R.10W. SE1/4 SE1/4 Sec.3 during January, 1978. The 500 trees planted were rootstock with grafts of scionwood collected from fifty "plus trees" located in the Glendale Resource Area. The Quail Creek Grafted Field Orchard had its first cone collection in 1991.

SPECIAL STATUS PLANTS OBSERVED IN GLENDALE R.A. 10/26/93

GENUS/SPECIES	UCOW	MCOWN	MCOWS	WFCOW	ROGUEW	ROGUEE	GRAVEW	GRAVEE	HABITAT
Allium bolanderi bolanderi AS		✓							clay soils open woods
Allium bolanderi mirabile AS									clay soils open woods
Astragalus umbraticus AS		✓		✓			✓		open woods rich soils
Bensoniella oregana FC					✓				moist meadow and stream side
Camassia howellii FC								✓	serpentine soils
Cypripedium fasciculatum BS							✓		moist, heavy duff mix conifer forest
Fritillaria glauca AS			✓					✓	barren dry rock slope
Lewisia leana AS	✓								high ridges serpentine
Limnanthes gracilis gracilis BS							✓		wet ground serpentine
Mimulus douglasii AS									open gravel moist serpentine
Mimulus pygmaeus FC									damp sites open woods
Sedum moranii FC					✓	✓			rock outcrops serpentine
Silene hookeri AS									rock knolls serpentine

✓ indicates presence within LAU
AS assessment species
FC Federal Candidate
BS Bureau Sensitive

Sugar pine trees were tagged and painted under the Rust Resistant Sugar Pine program. The objective was to find and develop sugar pine that are sufficiently resistant to white pine blister rust disease so as to propagate resistant seedlings for use in the reforestation program. Medford district records indicate a total of 83 sugar pine were selected as candidates in the L.A.U. Tree selection was completed in 1982. Cones were collected from several candidate trees through the 1980's and early 1990's. Some of these trees were screened during the 1980's by testing the seedlings grown from the collected seed. A total of 23 candidate sugar pine located in the Rogue Frontal West unit are currently known to have some rust resistance. Complete information regarding status of all candidate sugar pine trees is available from the tree improvement group of the district staff.

The FIR program was a cooperative effort of forest management agencies, forest research institutions, and timber industry companies and associations in southwestern Oregon established in October, 1978. Responsibility for the program was shared by the College of Forestry at Oregon State University and the USDA PNW Research Station. It represented a determined effort to expand knowledge of practices necessary to reforest sites, particularly in conjunction with even-aged silvicultural systems. The FIR program officially ended September 30, 1991.

Four research plots were installed in clearcut units within the LAU. Their locations are :
T. 32S, R 9W, sec. 15.
T. 32S, R 9W, sec. 17.
T. 32S, R 9W, sec. 5 and 6.
T. 33S, R 10W, sec. 1.
Information on these plots is available in Glendale RA files.

g. Noxious weeds

There has not been any inventory for noxious weeds in the LAU. Tansy ragwort is known to occur, but its status, distribution and trend is unknown.

h. Forest Health

This unit does not appear to have any major forest health concerns at this point. While diseases, insects, and other conditions occur, there is no apparent, widespread condition which would constitute a management concern. Some of the factors which have been observed within the LAU include: red ring rot (Phellinus pini), sugar pine blister rust, blackstain (Leptographium wageneri), other fungus infections, and various insects such as wood borers and bark beetles.

5. Forest Products

a. Timber

Major commercial tree species found within the Rogue Frontal West LAU consist of the following:

Douglas-fir (Pseudotsuga menzeisii)
Incense-Cedar (Libocedrus decurrens)
Ponderosa Pine (Pinus ponderosa)
Sugar Pine (Pinus lambertiana)
Western Red Cedar (Thuja plicata)
White Fir (Abies concolor)
Western Hemlock (Tsuga heterophylla)
Knobcone Pine (Pinus attentuata)
Port Orford Cedar (Chamaecyparis lawsoniana)

There are approximately 2,893 acres withdrawn from intensive timber management within the LAU. Within the general forest matrix identified in Option 9 there are about 1,124 acres of withdrawn land; comprising about eight percent of this allocation. The majority of these acres were withdrawn due to rocky soils which preclude successful replanting.

The standing timber is basically high quality, large log, old growth. The estimated acres and volume of standing timber per age class, based on the 5 point inventory plots, is as follows:

Age 0-9	2232 Acres	Est. Vol. 0
Age 10-19	979 Acres	Est. Vol. 0
Age 20-49	4781 Acres	Est. Vol. 38,000 bf.
Age 50-109	2272 Acres	Est. Vol. 57,000,000 bf.
Age 110-199	20671 Acres	Est. Vol. 723,000,000 bf.
Age 200 +	12377 Acres	Est. Vol. 742,000,000 bf.

Total estimated commercial volume: 1.52 billion bf.

There are 23 permanent 5-point inventory plots within the LAU. This number is not considered adequate to give a true estimate of the volume within the LAU. This is however, the only information available at this time. A map showing the approximate locations of the 5 point inventory plots is available in the files.

There are an estimated 5,816 acres available for commercial thinning within the LAU. This figure is based on stands within the 20-80 year age class.

b. Special Forest Products

Major Products

Beargrass (Xerophyllum tenax) : This member of the Lily family appears throughout the areas at nearly all elevations, establishing itself after fire and other disturbances, and flourishing under 50-75% canopy closure, moderate rainfall, and poor to moderate sites.

Seasonal decorative tree boughs: The dominant species within the LAU include: incense cedar, sugar pine, and ponderosa pine. Occurring in lesser amounts but of higher value are Port-Orford cedar and western redcedar. Douglas fir, while occurring in great amounts, has little value when used as bough decoration.

Christmas trees: Historically, the Rogue Frontal West unit has not been a significant source of Christmas trees because of the distance from any community.

Mushrooms: The unit is in the appropriate range for all of the wild mushrooms deemed commercially valuable. They include: chanterelle (Cantharellus cibarius), morel (Morchella conica and Morchella esculenta), matsutake (Armillaria ponderosa and Tricholoma matsutake), bolete (Boletus edulis and others), and hedgehog (Dentinum repandum). There has been no inventory for these species. There have been few commercial permits in the past, but increased interest could lead to greater activity.

Firewood: Firewood is an important product in the unit for both personal and commercial purposes. Slash, leftover from cutting activities, is the primary source of material and therefore firewood abundance is related to cutting occurrences. Pacific madrone, tanoak, golden chinkapin, California black oak are the species of choice among the hardwoods. Douglas fir, any pine, cedar, or other conifer are much less desirable but would be taken when no hardwoods are present. All of these species are abundant in the LAU.

Other Wood Products: Other potential forest products include: decorative wood, burls, furniture, toys, and other specialty products. Primarily, the hardwoods are used, especially Pacific madrone, tanoak, golden chinkapin, California black oak, as well as bigleaf maple, manzanita and Pacific yew. Other products coming from conifers, such as posts, poles, shakes, etc. are also present.

Recently large quantities of Pacific yew bark has been sold to a narrow market for research purposes. It is likely that more bark will be sold in the future. This tree occurs throughout the LAU.

Other forest products: Special forest products are quite diverse. Within the Rogue Frontal West LAU, there have been permits sold for evergreen huckleberry (Vaccinium ovatum), and salal (Gaultheria shallon). In the future, there will likely be permits sold for prince's pine (Chimaphila umbellate), vine maple (Acer circanatum), herbs (too numerous to mention), ferns, Pacific rhododendron (Rhododendron macrophyllum), dwarf Oregongrape (Berberis nervosa), and mosses, all of which occur in large amounts in the Middle Cows and the Glendale R.A.

6. Wildlife and Fish

a. General Wildlife Habitat Condition

The unit has a variety of wildlife habitats, with relatively large areas of old growth habitat in Kelsey Creek and along the Rogue River and more cut-over lands in Mule Creek.

Old growth habitat is relatively abundant within the landscape and includes several large blocks. Block size of old growth patches ranges from 20 acres to approximately __ acres of contiguous habitat. There are about __ patches of old growth habitat with more than 300 acres of contiguous habitat and __ patches with at least 1,000 acres.

Connectivity between patches is also of relatively high quality. The solid block ownership and large amount of unentered forest are major reasons for this condition. Even in Mule Creek which has the highest degree of habitat fragmentation there is a fairly intact corridor running along the E. Fork Mule Creek. There are no extensive areas where old growth habitat has been removed.

The Mule Creek area was identified as a priority for elk management in the early 1980s in cooperation with ODFW. This drainage was analyzed for elk habitat condition using the Wisdom elk model (Wisdom, et. al. 1985) in which habitat effectiveness indices are developed. With this analysis, it appeared that indices for spacing, forage and road density were all very low, while the cover index was somewhat higher. With this in mind, efforts were made in the late 1980s and early 1990s to increase available forage through seeding clearcuts and burning two small meadows. A major road management plan was also instituted and 43 miles of road were closed to motor vehicle use.

Habitat for snag-dependent species has been severely reduced in the Mule Creek drainage by clearcutting and salvage entries. The same is true for species associated with down logs. In other parts of the unit snag and log habitat remains fairly well abundant and is probably above the target of 60 percent of optimum population levels for woodpeckers.

Black bears and cougars are probably relatively abundant in the area, particularly due to the proximity of the Rogue River and the large areas with low road density.

b. Special Status Species

Table 7 lists the known or suspected special status species in the landscape unit. Beside spotted owls, few inventories for these species have been conducted.

Spotted owls
There are seven active spotted owl sites known within the landscape unit. Inventories have been fairly thorough in the East Fork Mule creek drainage, but have been relatively light in the other parts of the unit. It is likely that other sites will be found with higher intensity inventory.

There are approximately 17,724 acres of suitable owl habitat in the landscape unit and outside of the wilderness area (Table 8 and Map 3). The habitat within the wilderness area has not been adequately assessed for spotted owl habitat. In some areas such as Kelsey Creek and Quail Creek there are large contiguous blocks of suitable habitat which have not been entered with logging operations. In others, such as Mule Creek, the habitat consists of small patches between clearcuts and stringers along streams. Mule Creek also has extensive areas of older forest which has had a history of partial cutting. Some of these stands still provide suitable habitat and others may not. The value and functions of these partial cut stands as owl habitat is uncertain.

There are 8,435 acres designated as critical habitat for spotted owls within the LAU (Map 4). Approximately 5,533 acres (66%) of this critical habitat is considered suitable habitat. Critical habitat comprises 3,821 or about 26 percent of the lands allocated as general forest matrix under option 9.

Spotted owl dispersal habitat is generally considered adequate for ensuring successful movement of young birds away from their natal areas and locating potential new core areas. There are portions of 12 quarter townships located within the RFW unit. Most quarter townships are currently above the 50-11-40 standard for dispersal habitat. In four quarter townships the forest has been clearcut to the point where less than 50 percent of BLM ownership contains adequate dispersal habitat.

Table 7. Special Status Animal Species - Rogue Frontal West LAU.

Species	Status	Presence	Inventory
Peregrine Falcon	FE,ST	S	N
Gray Wolf	FE, ST	A	N
Bald Eagle	FT, ST	D	2
Northern Spotted Owl	FT, ST	D	4
Marbled Murrelet	FT, ST	U	N
Western Pond Turtle	FC, SC	D	3
Del Norte Salamander	FC, SV	D	3
Cascades Frog	FC, AS, SC,	U	N
Mtn. Yellow-legged frog	FC, SU	U	N
Red-legged Frog	FC, SU	U	N
Spotted Frog	FC, SU	U	N
Northern Goshawk	FC, AS, SC	D	2
Mountain Quail	FC	D	-
Townsend's Big-eared Bat	FC, SC	S	N
White-footed Vole	FC, SP	U	N
Fisher	FC, AS, SC	U	N
Wolverine	FC, ST	U	N
Burnell's False Water Penny Beetle	FC	U	N
Denning's Agapetus caddisfly	FC	U	N
Green Springs Mtn. farulan caddisfly	FC	U	N
Schuh's homoplectran caddisfly	FC	U	N
Obrien rhyacophilan caddisfly	FC	U	N
Siskiyou caddisfly	FC	U	N
Alsea ochotrichian micro caddisfly	FC	U	N
Franklin's Bumblebee	FC	U	N
Oregon pearly mussel	FC	U	N
Fringed Myotis	BS, SV	U	N
Clouded salamander	AS, SC	S	2
Tailed Frog	AS, SV	S	N
Black Salamander	AS, SP	U	N

California slender salamander	AS, SP	U	N
California Mountain King Snake	AS, SP	U	N
Common King snake	AS, SP	U	N
Pileated Woodpecker	AS, SC	D	N
Black-backed Woodpecker	AS, SC	U	N
Three-toed Woodpecker	AS, SC	U	N
Flammulated Owl	AS, SC	D	N
Purple Martin	AS, SC	U	N
Great Gray Owl	AS, SV	U	N
Western Bluebird	AS, SV	U	N
Pacific Pallid Bat	AS, SC	U	N
Pine Marten	AS, SC	U	N

Status:
FE - Federal Endangered
FT - Federal Threatened
FP - Federal Proposed
FC - Federal Candidate
BS - Bureau Sensitive
AS - Assessment Species (BLM)
SE - State Endangered
ST - State Threatened
SC - State Critical
SV - State Vulnerable
SP - State Peripheral or naturally rare

Presence:
D - Documented
S - Suspected
U - Uncertain
A - Absent

Inventory:
N - No surveys done
1 - Literature search only
2 - One field search done
3 - Limited field surveys done
4 - Protocol completed

Map 3. Suitable habitat for spotted owls within the Rogue Frontal West LAU.

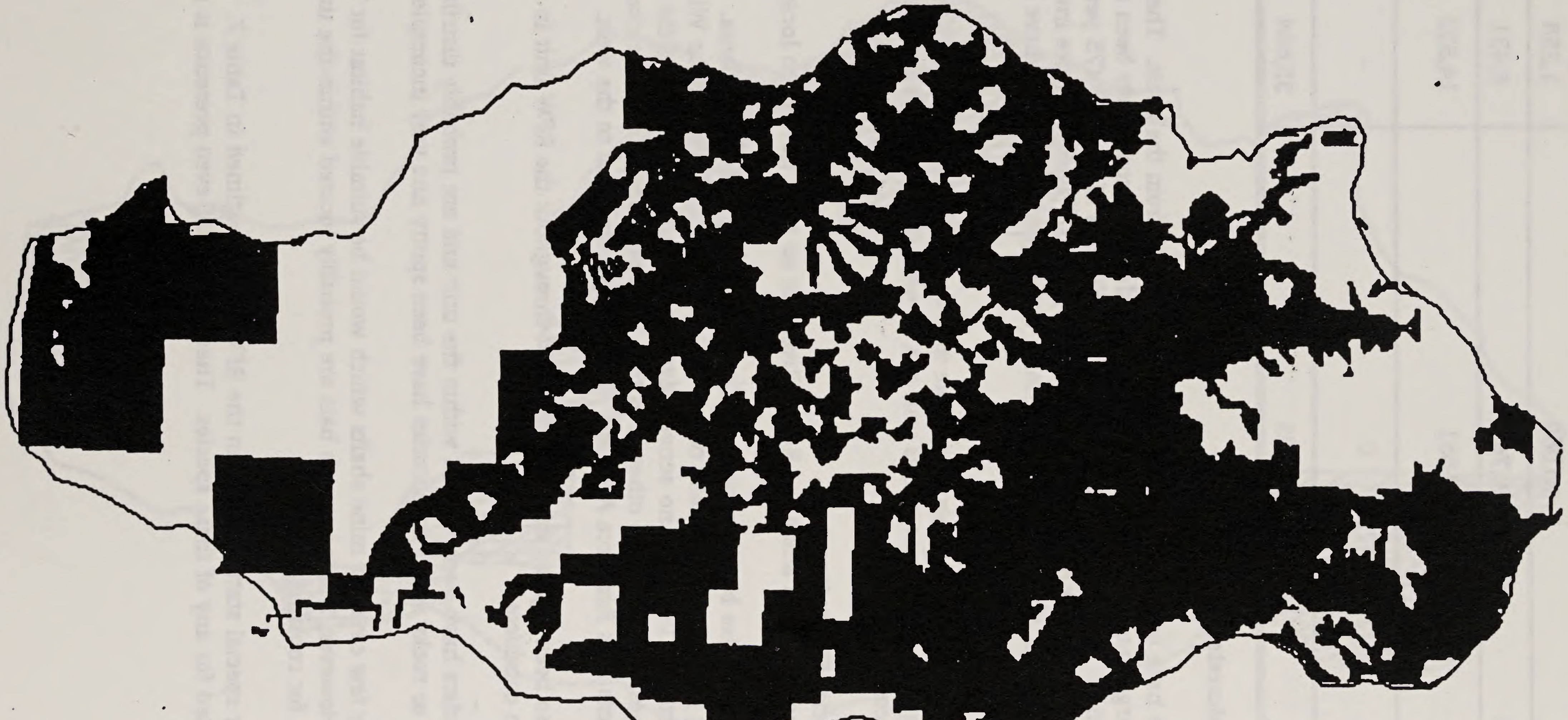


Table 8. Suitable spotted owl habitat within the Rogue Frontal West LAU.

Designation	Suitable Owl Habitat Acres	Total BLM Acres
LSR	7,805	11,462
Connectivity	10,068	1,258
Wilderness Area	2,761	8,431
Forest Matrix (Option 9)	8,651	14,533
Non-BLM lands (2510 acres)	0	-
TOTAL	20,485	35,684

Marbled Murrelet

Marbled Murrelets have been found as far inland as 50 miles from the coast. They generally nest in old forest stands on large, moss-covered limbs. The lands along the coast have been split into bands of varying distances from the ocean. Approximately 27,590 acres of the LAU (75 percent) lies within the 35 miles of the coast, the rest is 35-50 from the coast (Map 5). Forest Service inventories have detected Marbled Murrelets within 5 miles of the RFW unit. Virtually no inventories have been conducted within the unit.

There are approximately 14,524 acres of suitable marbled murrelet habitat within the landscape unit. Virtually all stands with older trees in this unit can be considered suitable habitat, even those which have been partial cut in the past.

Other Special Status Species

Bald eagles have been sighted along the Rogue River but no nests have been located.

Peregrine Falcons have also been sighted, especially in the Horseshoe Bend area. There is ample cliff habitat for nesting peregrines, especially near the river and in the Wild Rogue Wilderness. A helicopter survey was conducted in 1986 and no active ledges were located and none of the cliffs was rated very high as potential nest sites. But no other inventory has been conducted. The closest peregrine eyries are located in the Grants Pass Resource Area and on Forest Service land to the west.

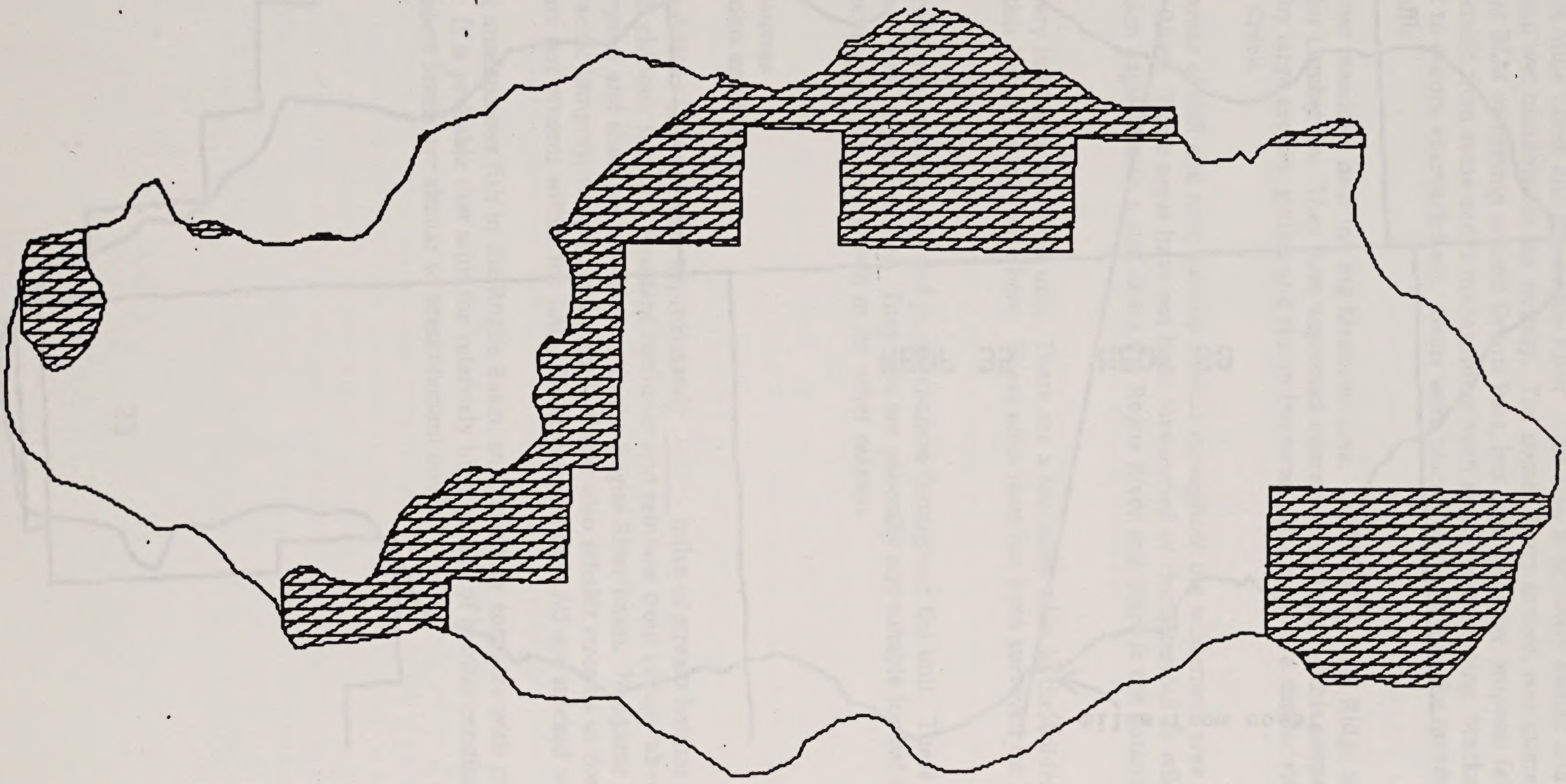
Goshawks have also been sighted and probably nest throughout the RFW unit in older forest stands. No inventory has been conducted.

Del Norte salamanders have been located within the unit and are probably distributed widely in areas of moist, shady talus or rocky soils. Inventories have been spotty and very incomplete.

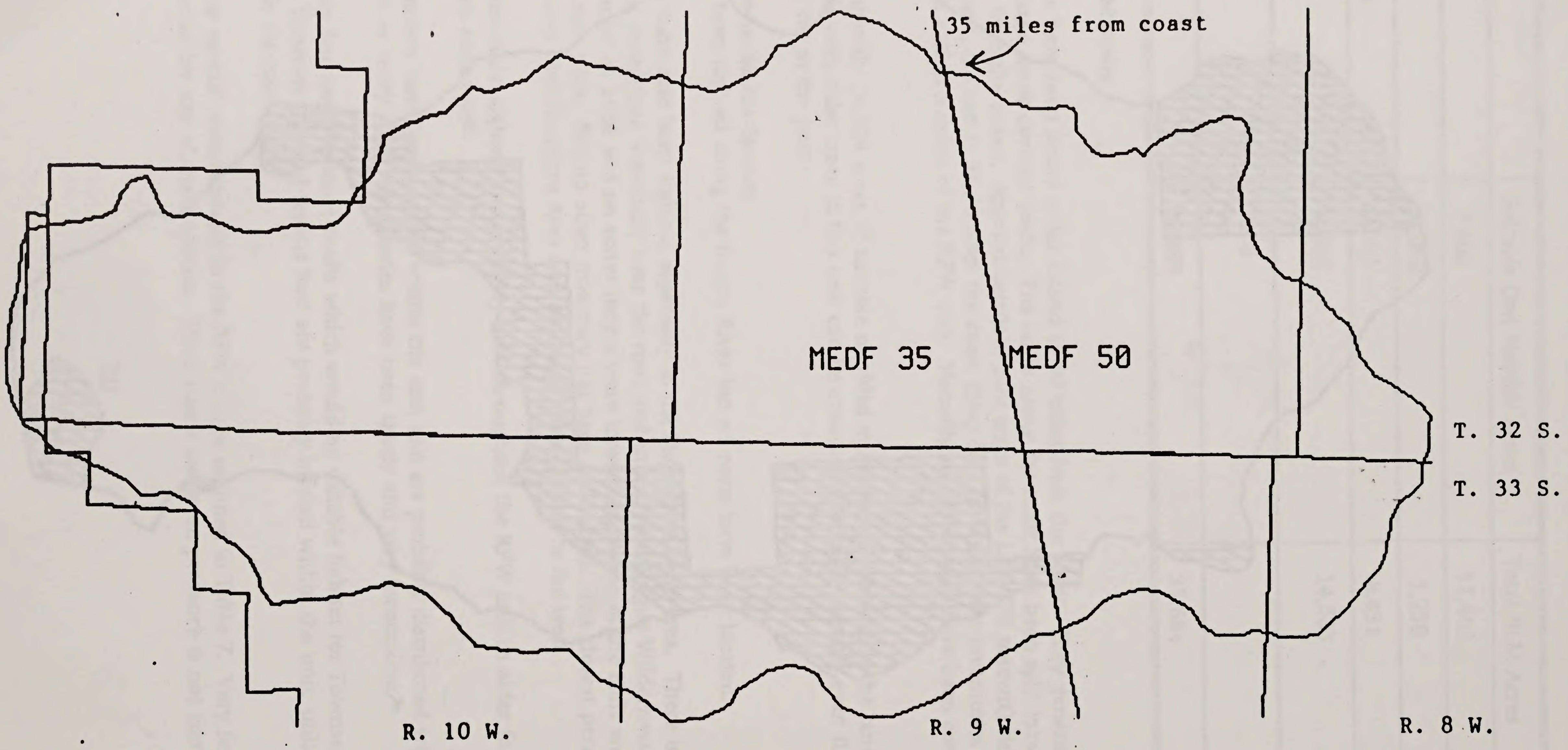
There are probably few caves or mine shafts which would be suitable habitat for Townsend's big-eared bats in the unit. However, fringed myotis bats are probably located within the unit, utilizing snags in older forest stands for roosting.

The status of other special status species in the RFW unit is outlined in Table 7. Very few inventories have been conducted for any of these species. Their status and even presence is not certain.

Map 4. Critical Habitat for the northern spotted owl within the Rogue Frontal West LAU.



Map 5. Marbled Murrelet zones within the Rogue Frontal West LAU.



c. Special or unique habitats - Meadows, cliffs, wet meadows, etc.

There are a few areas of meadow habitat located within the landscape unit. Two small meadows are located near the north edge near Anaktuvuk Saddle. These are on federal ownership and have been burned to improve forage conditions. Big Meadows is a large (70 acres) meadow located near the divide between East Fork Mule Creek and the Rogue River. This area is privately owned and there are several small meadows and wet meadows in the vicinity. The owner, Larry Brown, was interested in exchanging that land for other BLM ownership around Grants Pass, but that exchange proposal fell through. This meadow could benefit from some active management such as burning, seeding, bracken fern eradication and tree removal to reduce encroachment. Gates were placed on roads into the meadow area to reduce motor vehicle traffic.

There are two other meadows near the Big Meadows area. One is called Bald Ridge and is mostly owned by Superior Lumber Co. They have expressed interest in exchanging this property. This meadow is characterized by large erosion gullies and slump fractures. The other is a similar ridge between Quail Creek and Ditch Creek.

There are large areas of cliff and rock outcrop habitat throughout the wilderness area and in places along the Rogue River. These areas have not been inventoried or characterized as wildlife habitat. There is one golden eagle nest in a cliff along the Rogue River and there is the potential for peregrine falcon eyries.

Cave habitat is very limited in the RFW unit. There are a few mine adits in the wilderness area, but other than that this habitat is very rare here. These adits have not been surveyed for bats or other wildlife.

There are numerous man-made ponds and pump chances throughout the unit. These are small ponds with no evidence of use by pond turtles. They also are generally not suitable for bat sampling using mist nets because they are too overgrown or for other reasons.

d. Fisheries Resources
Distribution and Status

The Rogue Frontal West LAU provides approximately ______ miles of stream habitat for winter steelhead and fall chinook salmon. Resident cutthroat and rainbow trout occupy about______ miles (Table 10). Sturgeon and shad are also present in the Rogue River basin. Nongame species such as speckled dace, Pacific lamprey, sculpin, and redside shiner also inhabit streams in the LAU. Searun cutthroat trout are not present within the LAU. No streams in the LAU are stocked with hatchery fish.

Historic levels of anadromous fish in the Rogue Basin, and how they compare with present levels, are not well known. It is probable that with the relatively high quality of habitat conditions present within the LAU that present levels are similar to presettlement levels.

Table 10. Miles of Anadromous and Resident Salmonid Habitat in the Rogue Frontal West Landscape Analysis Unit

Subwatershed		Anadromous	Resident
Number	Name		
4AP	Mule Creek		
4AQ	Arrasta Fk. Mule		
4AR	West Fk. Mule Cr.		
4AO	East Fk. Mule Cr.		
4AN	Quail Cr.		
4AM	Ditch Cr.		
4AL	Kelsey Cr.		
4AK	N. Fk. Kelsey Cr.		
4AJ	E. Fk. Kelsey Cr.		
4MB	Frontal Basins		
	Rogue Frontal West LAU TOTALS		

Habitat Condition

Streams in the landscape unit have some of the best water quality in the Medford District because of their remoteness, geology and hydraulic character. Areas disturbed by mining activities from 1850-1930s are well vegetated and have no water quality concerns.

There has been extensive timber harvest and road construction in the Mule Creek basin and also in Kelsey Creek. Harvest has disturbed riparian habitat along small, non-fishery headwater streams by removing future sources of downed large woody debris and drastically reducing structural diversity. Future consequences of this activity may be accelerated routing of sediment from roads to streams and downcutting of small, steep stream channels. Inventories of upper mainstream Mule Creek and it's tributaries have not been conducted. But due to the high road density it is probable that sediment may be limiting aquatic productivity in some locations. All other subwatersheds within the LAU have few miles of road or are unroaded and are not influenced by significant human activities.

Kelsey and Mule creeks are the primary fish-bearing streams in the landscape unit. Streams in the landscape unit drop quickly to the Rogue River through steep, narrow, bedrock canyons. These conditions tend to provide cool, well-oxygenated water despite of the streams' north-south orientation. High velocity flows in these streams during the wet season, especially in their mid and lower reaches, prevent formation of many suitable spawning areas, limit the area that is available for juvenile salmonids to escape high water velocity and also prevent accumulation of large woody debris, an important component of quality fish habitat. High velocities scour sediment from streambed gravels but also largely prevent periphyton and aquatic insects from colonizing rock surfaces.

Streams in this landscape unit, especially Mule and Kelsey creeks, and the plumes of cool water they provide in the Rogue River provide a thermal refuge for adult and juvenile salmon and steelhead during summer when temperatures in the river exceed 75F.

Stream habitat conditions are displayed in Table 11. Stream condition is based on riparian condition (Table 4 - Watershed section), but also includes subjective evaluations of stream band stability, amounts of disturbance, influence of roads and other sources of sediment, effects of sensitive soils areas, large woody debris in the stream channel, future sources of wood from riparian and upland areas and other factors. Approximately __ percent of all streams are in good condition.

Table 12 describes the general condition of fish habitat in each landscape unit, along with perceived causes for degraded habitat. Detailed information on the condition of key components of fish habitat (i.e. flow, water temperature. pool depth and instream cover) have not been collected for any stream in the landscape unit.

Habitat Improvement Activities and Monitoring

There have been no aquatic habitat improvement projects within the LAU.

A monitoring program for macroinvertebrates has been initiated in 1993 at the mouth of Mule Creek. The intent is to sample aquatic macroinvertebrates now and then sample again at five year intervals. No data from this monitoring is available yet.

7. Minerals

The western portion (Wilderness Area) of the LAU (T32&33S., R10W.) is in a zone identified in the RMP as having moderate potential for the accumulation of mineral resources. The area has had some mineral development in the past. The remaining area in the LAU has been identified as having low potential for the accumulation of mineral resources.
As of 2/2/93, there were 10 placer claims and 33 lode claims of record within the LAU. All are within the Rogue Wilderness Area and therefore are not considered a management constraint.

8. Social Resources

This unit is predominately solid block BLM ownership with small pieces of the Siskiyou National Forest on the western edge. Private lands consist of small holdings (Map 6). There is no significant industrial land ownership in this unit. There are no major communities within the unit but it does include the Rogue River Ranch and Marial Lodge. There are some rural residences within the LAU but they are scattered and few in number.

The Rogue Frontal West LAU Contains approximately 36,337 acres with the following owners:

Bureau of Land Management	33,829 acres
U.S. Forest Service	178 acres
State of Oregon	637.02 acres
Roseburg Lumber Co.	480 acres
Superior Lumber Co.	120 acres
L & G Brown	378.32 acres
Other	716.66 acres

There are no encumbrances (R/W's, withdrawals, etc.) of record which pose a management concern as of 10/27/93.

Table 11. Stream condition for the Rogue Frontal West LAU.

	BLM Streams				Non-BLM Streams				All Streams			
Compartment	P*	F*	G*	Tot*	P*	F*	G*	Tot*	P*	F*	G*	Tot*
Ditch Cr												
E Fk Kelsey												
Kelsey Cr												
Quail Cr												
Arrasta Fk Mule Cr												
E Fk Mule Cr												
Mule Cr												
W Fk Mule Cr												
N Fk Kelsey Cr												
Rogue Frontals												

* P = Poor F = Fair G = Good Tot = Total

Table 12. Fish Habitat Condition - Rogue Frontal West LAU

Stream	Condition[1]	Factors Limiting Potential Stream Productivity[2]
Mule Cr		
Arrasta Fk. Mule		
West Fk. Mule		
East Fk Mule		
Quail Cr		
Ditch Cr		
Kelsey Cr		
N. Fk. Kelsey Cr.		
E. Fk. Kelsey Cr.		
Frontal Basins		

[1] P = Poor, F = Fair, U = Unknown

[2] T = Timber harvest-related (i.e., timber harvest near streams, soil erosion from roads or from tractor logging)
M = Historical or current placer mining
A = Agricultural practices
I = Industrial discharges
R = Road location
W = Water diversion

Social resources include special use areas, cultural sites, recreation sites and areas, and places with historic value.
These categories include:

Hanging rock (2)
Rogue River Ranch (1,2)
Rogue River Wild & Scenic River (1,2)
Wild Rogue Wilderness Area (1,20)
Big Meadows (1)
Tucker Flat (2)
Mule Creek Trail (1,2)
Glendale-Powers Bicycle Area (2)
Mule Creek proposed Wild and Scenic River (1,2)
Mt. Bolivar (2)
Jacobs springs (1,2)
Ninemile springs (2)
Bald Ridge (1,2)
Kelsey pack trail (1,2)
Marial lodge (1,2)
Trapper's Camp (1,2)
Cold springs (1,2)

Legend:

1 = cultural or historic values
2 = recreational values

9. Air

There are three designated air quality areas, as defined by Oregon Department of Environmental Quality, which may affect management within the Rogue Frontal West LAU.

The Kalmiopsis Wilderness has been designated a Class 1, smoke sensitive areas. This area is located approximately 21 miles southwest of the unit. Regulations curtail burning between July 4 and Labor Day. The Wild Rogue Wilderness Area is a Class 2 smoke sensitive area.

The Grants Pass non-attainment area is 30 miles SE and the Medford/Ashland non-attainment area is 56 miles ESE of the unit.

10. Developments: Roads, quarries, impoundments and other developments.

There are approximately 219 miles of roads in the Rogue Frontal West LAU (Map 6). Road densities for each compartment are displayed in Table 1 (Watershed section). About 16 percent of the roads are unsurfaced. Approximately 29% of all roads have had transportation management objectives developed. The remaining TMOs for this analytical unit will be completed soon.

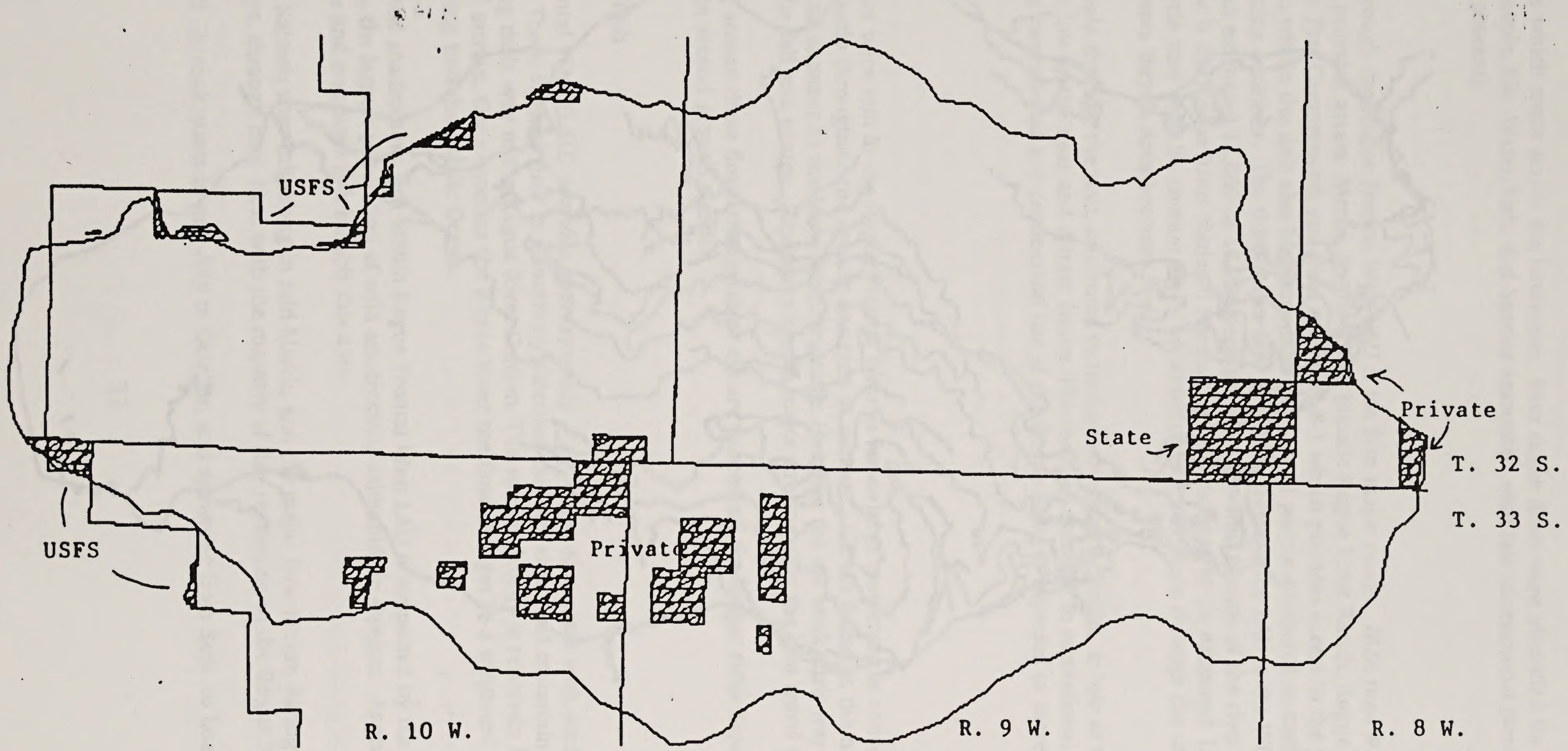
There are 8 quarries in the Rogue Frontal West. Four of these quarries are developed quarries, two are undeveloped and two have been depleted. The depleted quarries may be suitable for reclamation

The Rogue Frontal West has 5 helipods. Three of these helipods will need some work in order to be functional. We may need to build more of these in the future to give the area good fire protection. The area was planing for one helipond per township.

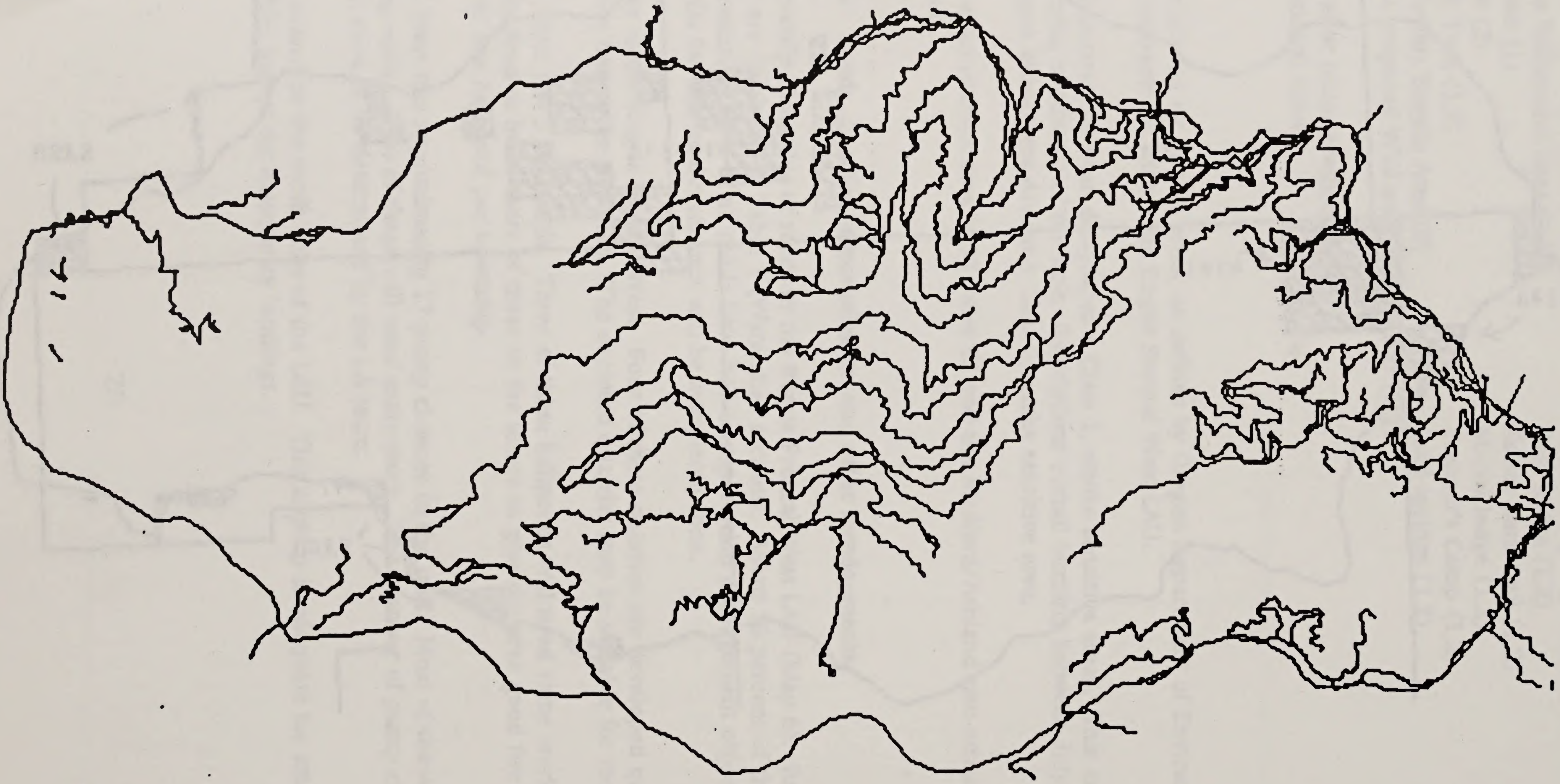
The Rogue Frontal West has approximately 17 pump chances in the unit. Most of these pump chances are in good working order. Two of these will need some work. The number of pump chances or impoundments will need to be determined by the LA team.

Calvert airstrip is located at the north edge of the LAU. This airstrip is adequate for small plane use, but is closed to the public except for emergency landings.

Map 6. Non-BLM lands within the Rogue Frontal West LAU.



Map 7. Roads within the Rogue Frontal West LAU.



B. Flows

Flows are things which move across the landscape. Four major flows were identified for the Rogue Frontal LAU People, Elk, Water/Fish, and Species associated with late successional forest habitat (See Appendix A for process):

People

People move through the Rogue Frontal West LAU is via four major routes. BLM road #32-9-14.2 (Back County Byway) provides access Marial, Rogue River, historic Rogue River Ranch, Rogue Wilderness Area,and Tucker Flat Campground, and BLM road #34-8-1 which provides access to the Oregon Coast. The road system within the unit also accommodates the flow of people attributed to timber and other resource harvesting activities. The third major flow of people through the LAU is the Wild and Scenic Rogue River. An estimated 11,000 to 12,000 people floated the wild portion of the river in 1993. The forth major flow is the Rogue River National Recreation Trail, utilized by an estimated 1,800 hikers in 1992. The bicycle may soon be another mode by which people will move through the unit, once the Glendale to Powers Bicycle Area becomes reality.

The flow of people through the unit, attributed to timber harvesting activities, is low at the present time and will remain low in the near and distant future. However, an increase in recreational use of the road systems and the recreational and commercial use of the Rogue River is expected to increase in the near future.

Elk

The elk flows are uncertain in the Rogue Frontal West as far as large movement is concerned. Elk have been sighted mostly throughout the area at one time or another. Elk are found in the higher elevations during spring and summer. in the Mule Creek drainage. However the elk work their way down to lower elevations in the fall and winter. Riparian zones in major streams offer the best travel routes.

During hunting season these flows change since elk are pushed off the higher ridge tops and saddles and move to cover in second growth stands.

Water/Fish

The Rogue Frontal West (LAU) provides approximately _____ miles of streams with similar characteristics. These streams flow in a southerly direction through steep and mountainous canyons eventual making their way to the Rogue River Canyon. The stream density is relatively high due to the steep, dissected terrain. Once entering the Rogue River the flow changes to a westward direction eventually flowing into the Pacific Ocean.

The major flow of anadromous fish within Rogue Frontal West LAU is supported by the Rogue River which produces the largest population of wild anadromous salmonids in Oregon. Approximately 23 species of game and nongame fish inhabit this area.

Sping Chinook Salmon start migrating in mid-March, and the major flow occurs during June. Spawning occurs from Sept. through mid. Nov. with the majority of fish remaining in the Rogue River to spawn.

The flow of Fall Chinook starts in mid-July to October, and spawning from Sept. to late Dec. Fall

Chinook Fry emerge and start their flow between late Feb. and May downstream back to the Pacific Ocean where they will live 2 to 6 years before returning to spawning area.

Coho Salmon enter the mouth of the Rogue River in mid-Sept. and slowly flow upstream to spawning beds, about 50 percent of the run originates from Cole M. Rivers Hatchery. Spawning and rearing occurs primarily in the river and tributaries.

Fry emerge between late March and early June and most juveniles spend about 15 months in their natal stream. The flow to the Rogue River and to the ocean occurs during May through early July. The Coho will spend 2 to 3 years in the ocean before returning. This species is considered to be at high risk in the Rogue Basin.

Other major flows of fish are the Summer and Winter Steelhead. The Winter Steelhead enter the river from November through March. Spawning occurs from March to June. Adult Steelhead on their first spawning run have spent 1 to 2 years in the Ocean.

Fingerlings in tributary streams will flow up and downstream into deeper pools of water as streamflow diminishes during the summer. Most of the Winter Steelhead juveniles emigrate to the ocean during late spring after two years of residence in freshwater.

Summer Steelhead enter the river in three different flows each year. Early-run adults enter the river in May,June,and July; half pounders enter in August and September; late-run adults enter in August to October.

Summer juvenile Steelhead will start flowing back downstream entering the ocean between April and June, remaining there for 3 to 5 months before making their first upstream migration.

Resident Fish flow up and downstream, sometimes staying in the same (pool) or area of water throughout their life time providing the habit conditions are sufficient. Resident adult trout residing in the river may move into tributaries and flow upstream to spawn during Feb.,Mar., and April, before returning to the river.

Fisheries streams in Rogue Frontal West (LAU) are;

Rogue River
Mule Creek
West Fork Mule Creek
Arrasta Creek
Kelsey Creek
Quail Creek

Late-Successional Species

There are approximately 1,098 species of plants and animals which are associated to some degree with older forests (FEMAT 1993). The mobility and movement patterns vary tremendously within this group of species. Spotted owls and goshawks have very large home ranges, are very mobile and can easily cross non-suitable habitat to locate islands of suitable habitat. Other species, such as some amphibians, non-vertebrates and even plant and fungus species have extremely small home ranges, may face substantial barriers to movement across non-suitable habitat.

The factors affecting movement of these species can be generalized across the landscape, however, even if they cannot be readily mapped. Some of the factors affecting movement of these species include: inherent movement rates of the individual species, size of habitat blocks, distance between blocks, quality of habitat within the blocks and degree to which the land between blocks impedes movement (sometimes referred to as porosity).

The Rogue Frontal West is characterized by two distinct patterns of late successional habitat. There are relatively large blocks of intact, unentered habitat in the southern part of the LAU (Kelsey, Ditch and Quail Creeks) and in the western part of the LAU (within the wilderness area in West Fork Mule Creek). There are also areas in the central portion of the LAU (Mule Creek, N. Fk. Kelsey Creek) in which timber harvest has resulted in more fragmented habitat, with some isolated islands of 20-60 acres.

Presumably those areas of large, intact blocks are able to sustain higher populations of these species within the blocks themselves. Smaller species such as amphibians and plants may find these larger blocks adequate to maintain populations for several decades, although it may be difficult to disperse or move between these blocks and other areas in the province due to timber harvest. Larger and more mobile species may find adequate habitat conditions for a few home ranges, but would rely on other blocks for sustaining a population in the long term.

The smaller, more fragmented blocks may no longer provide adequate habitat for some species at all; and they may provide adequate habitat for a few home ranges for others. The impact of fragmentation and habitat suitability on most species is not well known. In addition, those species which have limited mobility may not be able to move between these blocks very well.

C. Relationships between landscape elements and flows

The functional relationships between the four major flows and the primary landscape elements were analyzed (See Appendix A). They are presented here organized under the four major flows.

People

The activities and movement of people through the LAU can have a major effect on several elements and/or flows within the unit. Six major elements and/or flows determined to be most related to the flow of people were the Rogue Wilderness Area, Rogue River, recreational development, roads, timber and elk.

Rogue Wilderness Area: People move through the LAU to reach the wilderness area. People using the wilderness area may diminish the "wilderness experience" for others. Current use levels appear to be low enough that this has not occurred.

Wild and Scenic Rogue River: The same can be said for the river, the more people using the river, the more it may diminish the overall experience. This is the major reason for the current permit requirements.

Recreational Development: At the present time there is one developed campground within the LAU, Tucker Flat. Tucker Flat is the gateway to the Rogue Wilderness Area and is itself a destination area. The amount of people could have an adverse effect on the quality of "camping", but this does not appear to be the case at this time.

Roads: The flow of people through and within the LAU is generally confined to roads within the Unit, and the amount of travel a road receives is related to the type of surface, such as paved vs natural surface vs rocked surface. The more traffic a road system gets the more damage it will receive.

Roads allow access to other resources. The manipulation of road closures allows for the administration and management of other resources.

Elk: Elk attract people to the LAU for the purpose of hunting and viewing, thus having a direct effect on the mortality rate of elk within the LAU. The activities and movement of people through the LAU in relation to other resources, could disturb elk within the unit, especially during the calving season, and in winter elk often use the roads as travel lanes.

Timber: People are attracted to "Old Growth" stands of timber for various reasons (hiking, viewing, photography, etc.) and the Rogue Frontal West has a considerable amount of 200 plus year old stands within the unit.

Elk

Relationship between elk flows and landscape elements in the Rogue Frontal West LAU was determined to have six major relationships involving: 0 - 9 and 200 plus year seral stages; recreation development and road development.

In areas of 0-9 seral stages there is no thermal cover but good forage. These areas can be enhanced by management practices which improve forage quality. In large clear cuts, even though forage may be present, it may not be used because elk tend to browse near the edge bordering mature stands.

When timber is removed from by timber harvest activities there is a potential disturbance to the elk. Thinning may remove thermal cover but will also provide forage. Burning may also affect the amount of forage available.

In areas of 200+ year seral stage, late successional (LS) habitat has been called optimal cover for elk (Wisdom 1986). Not only does this type of stand structure provide cool conditions during the summer, it also provides shelter from the wind and cold during the winter.

It also provides some forage. As a result, movements of elk may be related to the distribution and pattern of LS habitat in the landscape.

ODFW has also called for leaving buffers of 300 feet in LS habitat along streams to provide movement corridors within clearcut areas. Again, this appears to be functioning well in the East Fork Mule Creek compartment.

Any construction for recreational development during calving season would cause harassment to the elk.

In addition, recreation development which attracts more people to the area could result in increased disturbance to elk throughout the LAU.

Existing roads provide elk movement lanes while the road shoulders provide opportunities for forage.

Blocked roads would tend to enhance these travel lanes.

High densities of roads and locations in proximity to riparian zones within the watershed disrupts the movement of elk. In addition it reduces available habitat.

High traffic frequencies on arterial and major collector roads may disrupt movement or alter elk travel patterns.

Road construction activities during elk calving season may also cause harassment or reduction to the population.

Good elk management (i.e. hunting and habitat enhancement) enables the herd population and available forage to remain in balance. On the other hand, over hunting and poaching may reduce population levels.

High frequencies of recreation activities along roads and river curators may affect elk habitat during calving seasons and movement between forage areas.

Water/Fish

The flows of Water/Fish were identified for further analysis and description for this LAU. (See Table __) These flows had the most significant relationships with the following elements:

- transient snow zone openings
- clear cuts
- seral stages
- riparian zones
- Wild Rogue Wilderness Area
- Rogue River
- timber resources
- roads

Transient Snow Zone (TSZ) openings provide temporary water storage areas with snow accumulation. A rain-on-snow event increases the rate and amount of runoff, which is correlated to TSZ percentage and TSZ openings percentage. Accelerated routing of sediment into the streams is likely with increases in overland flows, particularly if the runoff occurs in areas with sensitive soils, recent ground disturbance, and/or high road densities. In the Rogue Frontal West LAU, the Kelsey Cr. compartment is most sensitive to rain-on-snow events according to watershed analysis trigger values.

The movement of water through the landscape is greatly influenced by the vegetation cover. The extent of vegetation cover can be categorized by seral stage. Early seral stage stands located in the TSZ function as openings subject to earlier and faster snowmelt, often resulting in surface runoff. These areas are termed "hydrologically open". Older seral stage stands are likely to have reduced overland flows, as compared to younger stands and openings. This is attributable to a higher water storage capacity within these stands. Water absorbency is enhanced with greater vegetation cover. This will moderate the fluctuations in water flow rates within the streams. The extent of the mature/old growth forest matrix in this LAU suggests effective capture and storage of precipitation, with streams of high water quality, particularly in the roadless Wild Rogue Wilderness Area.

The conditions of riparian zones directly impact the water quality and stream habitat conditions for fish and other aquatic organisms. If riparian areas are well vegetated, they serve as effective sediment filtering zones. Riparian zones occupied by mature/old growth stands enhance stream habitat conditions. These stands have been shown to have direct relationships to water quality (runoff retention and sediment filtering) and fish habitat. They provide a high level of shade on small streams which help maintain cool water temperatures preferred by the anadromous and resident fish. They also provide suitable levels of large, woody debris, which is an important component of fish habitat.

Ground disturbance has major effects on water quality. The overland flow of water facilitates the movement of sediment. The amount of sediment carried into riparian areas is influenced by the extent of ground disturbance within the watershed and its proximity to streams. Existing clearcuts represent the majority of acres within the LAU likely to contribute to sediment flow. However, these clearcuts are not the major source of sediment flowing into fish bearing streams. Currently, the equivalent clearcut acreage percentages are low for components of Rogue Frontal West.

Roads are a major source of sediment, and often will be the primary source of sediment flowing into streams. They can be barriers to the upstream movement of fish due to stream crossing structures which alter the stream gradient and/or flow velocity. The association of timber harvesting and increased road densities increases the potential for reduced water quality and fish habitat degradation. High sediment loads in fish bearing streams will adversely affect fish by limiting aquatic productivity if the flow of sediment is persistent. In addition, spawning gravels are degraded with sediment buildup. The only compartments with road densities approaching values at which management concerns begin to arise are the East Fork Mule Creek and North Fork Kelsey Creek. It is assumed that sediment may be limiting the aquatic potential in these areas. The majority of the compartments in RFW have low road densities.

The Rogue River is the recipient of all water flowing from RFW, and currently benefits from the high water quality characteristic of these tributaries. This, in turn, promotes the flow of fish within the LAU and downstream.

Relationship between the Flows of Late Successional Species and other landscape elements and flows.

The flows, or movements, of late successional (LS) species was one of the major flows identified for this LAU. Functional relationships between these flows and the primary landscape elements were evaluated. These flows had the most significant
relationships with the following elements:

-partial cuts
-water
-Rogue River
-early and mid seral stages
-clearcuts
-Wild Rogue Wilderness Area
-timber resources
-elk

Timber extraction, whether using clearcuts or partial cuts, have an obvious impact on flows of LS species by creating barriers to movement or by reducing habitat quality to varying degrees. The porosity of the barrier will depend on the species, the type of timber harvest and how the habitat characteristics such as canopy closure and coarse woody debris are altered.

Late successional forest stands have been shown to have direct relationships to water quality, hydrologic functions and fish habitat. These stands provide a high level of shade on small streams; they provide suitable levels of coarse woody debris to the streams; they filter sediment and reduce overland flows; they store water in down logs making it available in the summer; they provide a buffering function for riparian zones which ameliorate microsite conditions compared to early seral stages, and reduce the effects of major wildfire on the riparian zones;

These relationships are especially important for this LAU because of the proximity of the Rogue River; a high profile aquatic resource. The Rogue River also serves as a distinct barrier to movements of some LS species which are not able to successfully cross the river, or which may be subject or disturbance by high levels of recreational use. Conversely, the presence of this designated Wild River serves as a protected reserve for many species where disturbance is minimized.

The status of LS stands within the Wild Rogue Wilderness Area is not well known, but at least timber harvest has not been a factor in modifying forest stands here for several decades and the area contains extensive blocks of intact LS habitat. The area is large and is well connected to the rest of the wilderness area to the west and beyond on US Forest Service lands. As a result, LS species are able to freely move within this LAU and beyond. This is one of the primary functions of any wilderness area. And, as with the Rogue River, the wilderness area serves as a refuge for some species which may seek out the relatively undisturbed setting.

D. Natural disturbances and successional patterns

Successional Processes and Patterns

Successional patterns within the Rogue Frontal LAU are quite diverse. The extremes are represented by the low elevation, south slopes and shallow soil areas along the Rogue River, compared with the high elevation, more mesic conditions along the upper reaches near Anaktuvuk Saddle. Special cases of successional patterns occur on rocky outcrops and in meadows.

Following a stand replacement fire or other intense disturbance the conifer development is dependent on seed sources while many of the shrubs and hardwoods regenerate through vigorous crown sprouting. There is little grass/forb seral stage development as seen in the Cascades or Coast Range. Areas of dense shrubs or hardwoods with few conifers may result from repeated intense fires, as seen along the Rogue River and within the wilderness area on south slopes where canyon live oak and shrub fields are common.

Given an adequate seed source and growing conditions conifers tend to dominate the site and shade out the hardwoods and shrubs. How long this takes varies based on seed source, soil, moisture, aspect and other factors, but ranges from 15 to 45 years. During this period, the stand is vulnerable to another burn since the fuels are often continuous. However, as the conifer stands grow the shading and self pruning of limbs gradually reduces the risk of intense fires.

Hardwoods and shrubs gradually become re-established in the stand as the canopy opens due to conifer mortality. This generally occurs at ages 60-100 years. On low elevation, harsh sites, conifers may never completely dominate the site and hardwoods and shrubs may persist throughout the early and mid seral stages.

Eventually fires do enter the stand again. If they are intense, the successional stage will be reset to the original resprouting shrub/hardwood stage. Frequently, however, they result in an underburn, or create small canopy openings as individual conifers or small groups are killed. This stimulates more resprouting of hardwoods and shrubs, as well as providing seed beds for conifer seeds. As a result, a mosaic of age/structure classes develop. As the stand grows older, repeated underburns and patchy, intense burns create a very complex mixture of large, super-dominant conifers over several canopy layers of smaller conifers and hardwoods and shrubs. This situation is common in the middle elevation ranges of the LAU.

The upper reaches of the unit are characterized by large areas of fairly homogeneous stands of single canopy layer Douglas fir forests approximately 200 years old. In this area it appears that while light underburns may have occurred in the past several decades, the relatively fire-resistant Douglas fir trees have persisted and the canopy has not been opened up, except by timber harvest. The same basic successional patterns appear to be operating as on lower sites, but the high rainfall and deep soils help to extend the time frame considerably.

The development of the Big Meadows, Bald Ridge and other meadows within the LAU is unknown. It is likely that these openings were first created by repeated fires, perhaps man caused, and may now be maintained by fire and by gophers. It is clear, however, that these meadows are being invaded by Douglas fir in the past 4-5 decades.

Disturbance Characteristics and Patterns

The most important disturbance agents for this LAU are fire, wind, floods, and landslides. Of these, there is no doubt that fire is the most significant. The following discussion addresses how each of these agents affect the unit and how these effects are altered by human activity.

Fire

Fire characteristics

Fires in the LAU most frequently begin in mid-summer and can continue to burn until autumn rains fall, so they can often cover large areas. However, these fires are rarely of uniform, high intensity. Instead, they are generally characterized by a patchy, mosaic patterns with areas of intense fires and complete crown kill mixed in with areas of low intensity underburns where only occasional trees or small patches of overstory trees are killed. Evidence of low severity burns is seen in the virtually all older conifer stands. Repeated, high severity burns are revealed by the absence of older conifers on some sites dominated by hardwood trees.

Fire is linked with other disturbance factors, in conifer forests there are frequent post-fire insect attacks. Scorched trees are more likely to be successfully attacked by bark beetles and other insects. Crown scorch at levels about 50 percent is associated with 20 percent or more mortality by western pine beetle in mature trees, younger trees can survive more than 75 percent scorch with about 25 percent mortality. Insects are most likely to attack when growth rates decline due to fire damage.

Lightning is the most common source of ignition in these forests. Due to the low summer precipitation and increased lightning frequency, July, August and September are the months of greatest ignition activity.

Most of the drier forest types in the Rogue Frontal West (LAU) had a significant component of native American burning. Burning of tanoak was done to "kill diseases and pests" and to clean the ground under the trees so that the acorns could be picked up more easily. They also burned along ridge tops to maintain travel corridors and openings for production of hazel and beargrass, which were used for basketry material, one or two years after a site was burned. Big Meadows is one of the most significant

Fig. —

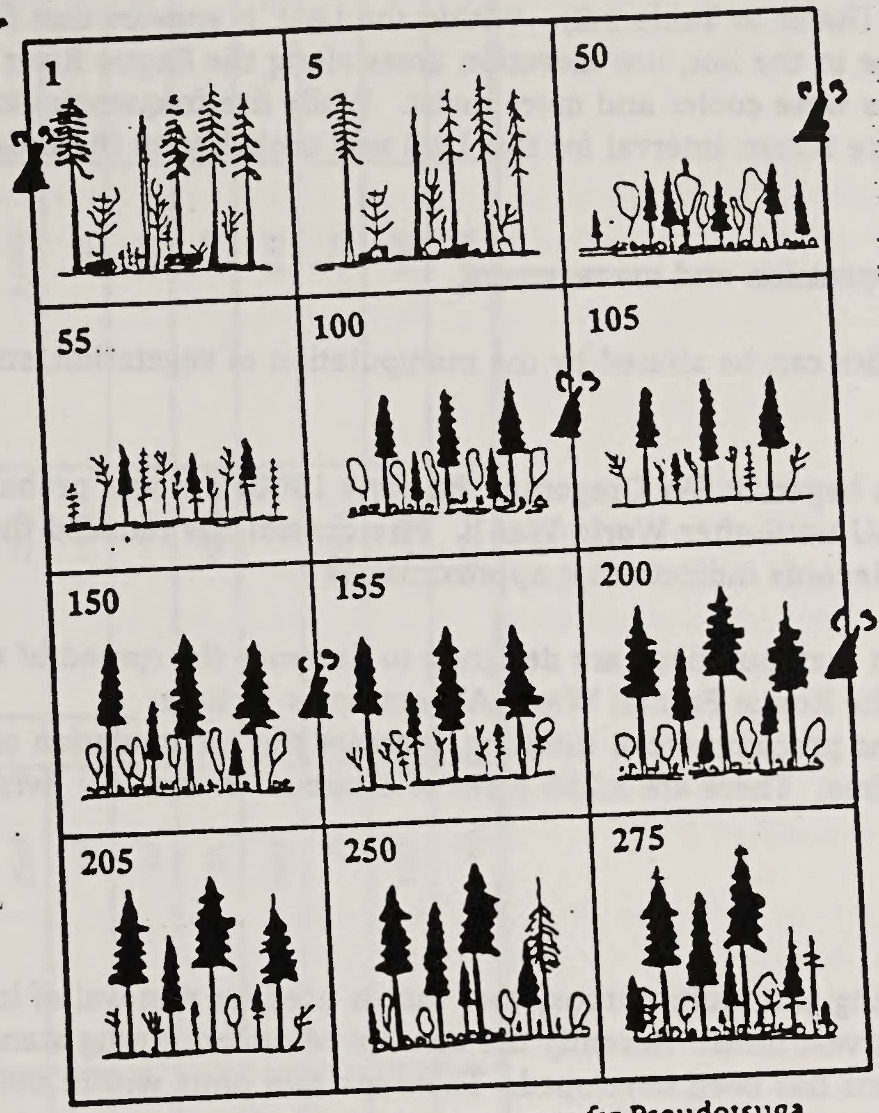


FIG. 10.2. *Stand development sequence for* Pseudotsuga menziesii*/hardwood forest. Fire-return interval is about 50 years. Fires are denoted by flame pattern with smoke puffs at edge of panels. Old-growth character is found in stands that burn with low to moderate severity over several fires, allowing the development of large residual Douglas-fir.* (From Agee 1991b)

from Agee 1993

P. 38a

meadow area's that was maintained by the Native Americans. Agee (1993) indicates that some experts believe that burning by native Americans probably simply complemented natural ignition in stands which would have burned from lightning strikes, rather than drastically altering the natural fire patterns.

Natural Fire Frequency

Fire frequency and fire return intervals vary between areas depending on stand characteristics, weather and topography (Refer to Table 1.2). Within the LAU, it appears that fires were probably more frequent and more intense in the hot, low elevation areas along the Rogue River than along the upper ridges where conditions were cooler and more moist. While fire frequencies varied a great deal, it appears likely that the fire return interval for this LAU was probably on the order of 30-80 years (Agee 1993).

Fire suppression and management

Fire characteristics can be altered by the manipulation of vegetation, structural diversity and density of stands.

Fire suppression began in SW Oregon in the early 1900s but was probably not effective in the Rogue Frontal West LAU until after World War II. Fire control has reduced the occurrence and the number of acres burned. Records indicate that approximately

Some vegetation manipulations are designed to decrease the spread of wild fires and reduce intensity of a fire. Within the Rogue Frontal West LAU examples include: _____________. Other management practices, such as precommercial thinning, increase the accumulation of fuels, as well as the resulting risk of intense fires. There are 1,256 acres of clearcuts in the LAU which have been pre-commercially thinned.

Prescribed burning is a multi-purpose tool that is used for removal of logging slash and control of vegetation in harvest units. Recently the concept of underburning stands to reduce fuels and simulate natural fire effects has been developed. There are two units within the LAU which have been slashed in preparation for this treatment and they await suitable burn conditions.

Natural fire disturbances

The largest, recent natural disturbance of fire in the Rogue Frontal West unit was the Quail Creek fire which occurred in 1970 and burned over ____ acres, including 150 acres within the LAU. This type of natural disturbance is relatively infrequent in this area. The fire burned on the south of the Rogue River as well as on south facing slopes in the LAU. Approximately 116 acres in this burn area was planted in 1972 and 1974 in ponderosa pine.

TABLE 1.2. FIRE-RETURN INTERVALS FOR OREGON AND WASHINGTON OVER THE PAST FEW CENTURIES

FOREST TYPE	OREGON			WASHINGTON		
	Area in Type[a] (1,000 ha)	Fire Cycle (yr)	Area Burned per year (1,000 ha)	Area in Type (1,000 ha)	Fire Cycle 937[g]	Area Burned per Year (1,000 ha)
Cedar/spruce/hemlock	292	400[b]	0.7	1,291	937[g]	1.4
Douglas-fir	4,444	150[c]	29.6	3,068	217[j]	14.1
Mixed conifer	399	30[d]	13.3	504	50[k]	10.1
Lodgepole pine	757	80[e]	9.4	211	110[l]	1.9
Woodland	1,001	25[f]	40.0	12	25	0.5
Subalpine	1,075	800[g]	1.3	935	500[m]	1.9
Ponderosa pine	3,142	15	209.4	1,438	15	95.8
Other	2,397	133[i]	18.0	1,949	298	6.5
Total/Average	13,507	42	321.7	9,408	71	132.2

[a] Andrews and Cowlin 1940, Cowlin et al. 1942.
[b] Agee (unpublished analysis from Andrews and Cowlin 1940).
[c] Means 1982, Morrison ad Swanson 1990.
[d] McNeil and Zobel 1980, Atzet and Wheeler 1982, Agee 1991b.
[e] Gara et al. 1985.
[f] Martin and Johnson 1979, Bork 1985, Atzet and Wheeler 1982.
[g] Extrapolated from Fahnestock and Agee 1983.
[h] Weaver 1959, Bork 1985.
[i] A weighted average of other types.
[j] Agee et al. 1990, Fahnestock and Agee 1983.
[k] Finch 1984, Wischnofske and Anderson 1983.
[l] Agee et al. 1990.
[m] Fahnestock 1976, Agee et al. 1990.

Landslides

The geology of the Rogue Frontal West LAU is characterized by the Dothan Formation which is composed mostly c sandstone, siltstone, and mudstone. As a result of this sand, silt, and mudstone contact, the entire unit east of Mu Creek is prone to translational (linear flow of material, shallow in nature) and rotational (slides in which the toe uplifts and depth of material is quite deep as opposed to a translational slide) slides. The Kelsey Creek drainage is an area where major slides and slumping has occurred. The southernmost portion of the unit from Mule Creek to Kelsey Creek also shows considerable soil movement in past years.

Floods

Floods in the Rogue Frontal West LAU have not been a major disturbance agent, despite the fact that much of the lands are in the transient snow zone. Undeveloped timber areas have held back rapid runoff causing little floodin

More recent records show some flooding in 1946 and larger floods in 1955, 1964 and 1974 when flooding washed out culverts in the Trappers Trap area of Kelsey Creek and a few other smaller culverts. Mule creek did flood up t the steps of the Anderson Ranch in 1974???.

In the past 30 years clear-cutting and road building have potentially altered these natural disturbance patterns. Clearcutting, especially within the transient snow zone can create larger impulses of water during heavy rainfall. Roads crossing streams create the potential for culverts to become blocked or overwhelmed which could cause sudden floods and downstream scouring. No significant instances within the LAU where this has occurred to date

Wind

Written material on wind or storms as disturbance agents in the Rogue Frontal West LAU or surrounding landsca could not be located, since much of the area was not developed prior to 1960.

District personnel who remember the 1962 Columbus Day storm or the timber damage caused by the 1955 storm indicated that these storms moved in from the coast very quickly. Winds were very intense accompanied by heav rainfall. Wind velocities ranged from 30 to 60 MPH with gusts in excess of 80 MPH. Both these storms originate as tropical low pressure systems and drove onshore from a west southwest direction. Both these storms affected t larger landscapes on both sides of the Rogue River which include the Rogue Frontal West LAU. Storms of this nature tend to cause timber windthrow and breakage along ridge tops and unprotected flat terrain. The Elk Valle and Walker Prairie drainages suffered extensive damage during the Columbus Day Storm. It has been observed th damage is often spotty during these types of storms with some areas receiving little or no damage.

Past management actions such as timber harvest and road building have affected the impacts of high winds. For example, heavy logging on the sides of ridges increases the potential for wind throw at the crest. Additionally, roads constructed near tops of ridges can weaken soil strength, causing greater risk of damage.

Insects and Diseases

The mortality associated with insect and disease outbreaks have been expressed in recent decades by the death o individual trees or patches of trees. This pattern of mortality is necessary to maintain a healthy ecosystem. Tree death is one of the most significant of forest ecological processes. The historic role of insects and disease in RFW natural forces of extensive change appear to be minor compared to fire. However, the extent of disturbances resulting from other agents of change, such as fire and wind, could have been influenced by the presence or absence of insect and disease activity. For instance, root diseases would predispose infected trees to blowdown. any event, a forest ecosystem must maintain a presence of dead, woody structure to be healthy. The association tree death and forest health is determined by the rate, scale, and processes involved in the tree mortality.

Historical records indicate that insects associated with tree mortality in southwest Oregon are bark beetles and the flatheaded fir borer. Annual statewide aerial surveys conducted by the Oregon Dept. of Forestry and the U.S.D.A. Forest Service locate bark beetle infestations. Review of surveys for 1990 through 1993 revealed negligible damage within the RFW landscape unit.

Plant pathogens are commonly found in forest ecosystems. The Rogue Frontal West unit is no exception. Records of widespread tree death attributable to disease in this LAU have not been found. However, specific plant pathogens have been identified as threats to the health of some commercial tree species within the LAU in recent years, including Douglas-fir under 30 years of age, sugar pine, and Port Orford Cedar (See Forest Health, p.15).

As with other disturbance agents, management activities have altered the impacts of insects and diseases within the LAU. For instance road construction and maintenance activities have introduced and spread black stain and Port Orford root rot diseases; and precommercial thinning in early summer might create suitable conditions for insect spread.

Pre-contact Landscape Conditions

As mentioned in the preceding section, the primary ways humans have affected the landscape and altered natural disturbance and successional processes within this LAU are through setting fires, timber harvest, road construction and fire suppression. Native Americans burned the forest in SW Oregon for hundreds of years and later, miners often started fires beginning in the late 1800's. The latter disturbances (timber harvest, road construction and fire suppression) have all been at work since approximately 1945.

The question of what baseline conditions should be used for "pre-contact", or "natural", or "undisturbed", or "pristine" conditions is always a difficult one. In fact these terms conjure up very different contexts with different people, as well as intense debate about whether native Americans in the 1400s or European emigrants should be considered as part of the "natural" landscape.

Aerial photos taken in 1953, present a picture of how the landscape appeared before logging, road construction and fire suppression. There are large, contiguous areas of late successional forest in East Fork and Arrasta Fork of Mule Creek; in Kelsey Creek and West Fork Mule Creek there is a distinct mosaic of older conifer forest stands on north slopes and along draws, intermixed with hardwood stands or young conifer stands - no doubt the result of fires and site conditions; the meadow areas such as Big Meadows and Bald Ridge are larger than at present and show that conifers have invaded these meadows considerably. There is one major slide evident along the East Fork Mule Creek.

While this is merely one snapshot of one point in time, it is quite possible these conditions are fairly typical of the landscape over the last couple hundred years. The mosaic landscapes in Kelsey Creek and West Fork Mule Creek were due to repeated fires, combined with rocky areas, hot aspects, and shallow soils. The relatively large expanse of contiguous conifer forest in the Arrasta Fork Mule Creek, with only scattered openings in the west portion of this drainage, probably represent near the maximum development of older conifer forests for this area. Fires no doubt burned through this drainage in the past, but must have been of relatively low intensity during the 1800's and 1900's. It is likely that views of this drainage throughout the last 500 years would show a shifting pattern of openings and forest that is difficult to recreate now.

Linkages

The conditions, flows and processes within the Rogue Frontal LAU have been described in the previous sections. This section will identify and discuss the significant relationships between this landscape and other areas outside o its boundaries. Emphasis has been placed on those linkages which might have significant influences on management activities or which might be affected by management activities within the LAU.

The primary external linkages identified for this LAU are:

People
Fish
Water
Wilderness Area
Economic considerations
Species associated with Late-Successional Habitat

The first group of linkages, lumped under the designation "People" include a variety of factors. The Rogue River and the trail connect this LAU with others on BLM and US FS lands for a large number of boaters and hikers. A plan for the Wild Section of the Rogue River has been developed. Most people confine themselves to the River, bu enjoy the visual resources, clean water and fish supplied by the RFW LAU.

The main road across the northern portion of the LAU is a link in a major route between Glendale and Gold Beach on the coast. The amount of traffic along this route is substantial, but has not been measured. The road to Maria on the Rogue River is within this LAU and is an important part of the Rogue River use. An additional consideratic in this regard is the developing bike route between Glendale and Powers.

Finally, dispersed recreation, primarily hunting, is a major consideration for people from Glendale, Roseburg and the Coast.

As discussed in the "Flows" section, anadromous fish from this LAU find their way to the Rogue River, thence to th ocean. They provide an important portion of the fish production available to ocean and downstream users. As a corollary, they are significantly affected by conditions downstream and in the ocean, as well as fishing pressure in both areas.

Similarly, water quality within the LAU has a direct influence on the water quality downstream, affecting recreational opportunities, fisheries resources, and domestic and municipal water supplies.

The wilderness area is a definite link in that approximately 1/3 of the area is within the LAU and 2/3 is outside, the Siskiyou NF lands. However, the entire wilderness area is managed by the Siskiyou NF as a single entity. Th primary concern is that management within the LAU will have to be coordinated fully with the Siskiyou NF and vice-versa.

The Rogue Frontal West LAU is linked to other areas in a variety of economic ways. Recreational use of the Rogu River has a substantial economic impact on a regional level, but is very important to the economies of Merlin, Galice and Agnes. Outfitters, guides, motels, tackle suppliers and other industries throughout SW Oregon benefit directly from this influx of people and there are a variety of indirect benefits as well.

Timber has been a major economic link between this unit and the Rogue and Umpqua valleys. Most of the timbe cut in this LAU has been hauled to Glendale and Roseburg, with a small amount to the Medford area. In turn, th impact contributes to the regional economy. Special forest products have been a much smaller link but there are indications use of these products will increase in the near future.

The LAU also provides links for species associated with late-successional forests. Of the 705,000 acres of late successional forest in the Klamath province (FSEIS 1994) there are approximately 26,000 acres (3.7 percent) in this LAU. Spotted owls have been documented moving into and out of the LAU. The unit is well within the range of marbled murrelet movements inland to find nesting sites. The Late-Successional Reserve (LSR) which comprises more than a quarter of the analysis unit extends south into the Grants Pass Resource Area. The entire LSR is approximately _______acres, with about 10,000 acres (___ percent) within the Rogue Frontal LAU. Within the LAU there is one connectivity/diversity block identified in the RMP to enhance movements of species associated with older forests move across the region, as well as provide richness and diversity to the general forest matrix.

F. Management Concerns.

Higher precipitation and less droughty conditions experienced in this unit make it less vulnerable to wildfire than the other portions of the Glendale Resource Area, but fire danger is still considered to be moderately high. Past and present management practices will cause increased fire intensity in the event of a wildfire. Fuel loading in some drainages is an increasing management concern. Broadcast burning is less constrained because of smoke management objectives, and in general we have been able to accomplish burning needed for site preparation. Fuel loading in individual watersheds will be a concern in future management actions.

In general reforestation success in this unit is high if needed site preparation is accomplished. Burning to reduce fuel loading and vegetative competition is often required to accomplish adequate reforestation and insure growth of planted seedlings.

The Rogue River view-shed has visual concerns and is classed as VRM 2.

Because of the potential for soil movement within much of the LAU, road location is a major concern in order to avoid headwalls (top) and toe slopes (bottom) areas of existing slide and /or slumps. Another major concern is the removal of trees, via clearcutting. Once the roots decay, they loose contact with the sandstone interface and create a potential for increased slide activity above what would occur naturally.

______ of the ____ quarter townships are already below the 50-11-40 criteria for spotted owl dispersal habitat.

Approximately _____ acres within the unit have been designated as critical habitat for the northern spotted owl.

Habitat for cavity users has been severely reduced by timber harvest.

This unit has a higher probability for Marbled Murrelets than any other unit in the Glendale Area.

Most of the major tributaries are significant anadromous fisheries streams.

Existing ECA levels greater than 25 percent may delay harvest activity for at least 5 years. These were listed in the unit description paragraph.

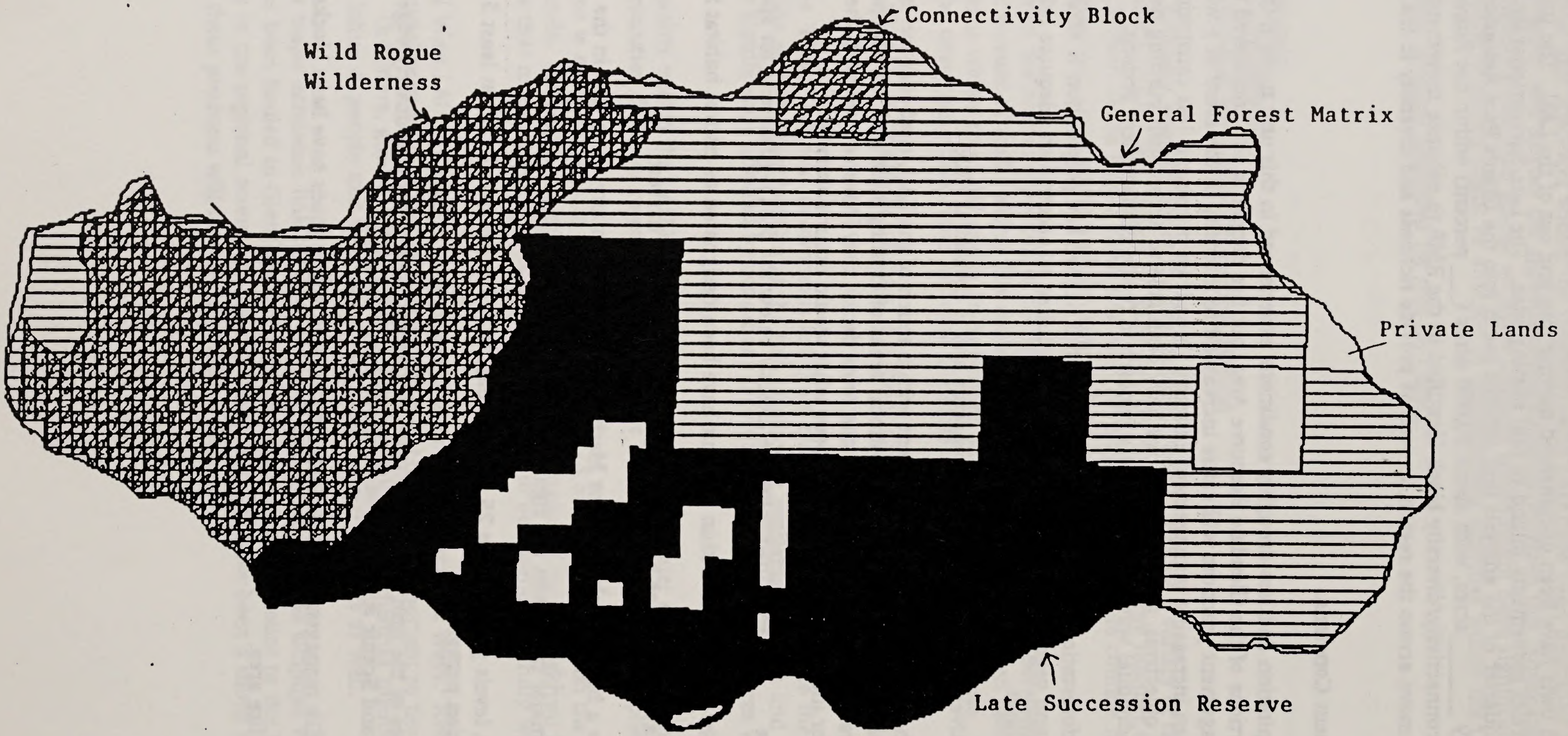
The west edge of the unit abuts the Rogue Wilderness area, and the southerly edge abuts the Wild section of the Rogue Wild and Scenic River. These are both class I air sheds.

Mule Creek Elk management Area, including an area where roads have been blocked for elk management purposes.

Quail Creek fire area.

Others???

Map 8. Major land use allocations under Option 9.



G. Management Opportunities

Will discuss opportunities for timber sales, habitat enhancement, recreational development, resource protection, etc.

IV. Landscape Design

A. Broad Landscape Management Objectives (from RMP, SEIS, etc.)

- Preliminary and incomplete

The goals and objectives for the Rogue Frontal West LAU are presented here, organized by major land use allocation (Wilderness, Late Successional Reserve, Connectivity Blocks, Riparian Reserves and General Forest Management Area or Matrix). The overall goals from the FSEIS are presented to set the context, followed by specific goals and objectives for the LAU.

I. Late Successional Reserve (includes spotted owl core areas, marbled murrelet reserves and other protection buffers

Protect and enhance habitat for late-successional and old growth forest related species including the northern spotted owl (FSEIS Appendix B7; pB-129)

LAU Goal 1. Protect present late successional habitat and promote development of additional late successional habitat on a sustained basis on lands suitable for developing such habitat.

Objective A: Suppress all wildfires until a detailed fire management plan can be developed.

Objective B: Create late-successional characteristics in stands where they are currently lacking in older stands (eg. create snags where they have been removed, develop multiple canopy layers, fall trees where large down wood has been removed, etc.)

Objective C: Within 10 years, evaluate and treat 100 percent of stands 50-110 years old to promote development of late successional habitat.

Objective D: Treat ____ percent of stands 20-49 years old to promote development of late successional habitat.

Objective E: Treat ____ percent of stands 0-19 years old to promote development of late successional habitat.

II. General Forest Management Area (GFMA) or Forest Matrix

Emphasis would be placed on the use of intensive forest management practices and investments to mainta a high level of sustainable timber production while maintaining long term site productivity, biological legacies and a biologically diverse forest matrix (FSEIS Appendix B1; p. B-11).

LAU Goal 1. Maintain or achieve a diversity of age and structure classes, including even- and uneven-age stands, with a larger percentage of stands less than 120 years old. Maintain habitat connectivity across the LAU.

Objective A: Create a corridor of unenven-age, multi-layer canopy stands in the upper Mule Creek/Anaktuvuk Saddle area (see Map __) to provide some older forest habitat, maintain high VRM, provide elk thermal and hiding cover and promote recreation.

Objective B: Maintain approximately 5 (?) percent of the Mule Creek area in early seral stages to provide forage and habitat for species associated with this habitat.

Objective C: Maintain existing large contiguous blocks (approximately 400 acres or larger) of interior lat successional habitat for the short term.

Objective D: Maintain and restore a late-sucessional habitat corridor along Mule Creek and one on Kelse Creek (see Map __) to benefit species associated with that habitat and to provide elk thermal and optimal cover. These corridors will be at least 600 feet wide at a minimum.

LAU Goal 2. Maximize timber production on a sustained yield basis while meeting other goals, objectives and management guidelines.

Objective A: Within 5 years evaluate and treat all understocked stands 0-30 years old to put them on a trajectory to meet GFMA goals.

Objective B: Within 5 years treat 30 percent of older, partial-cut stands to meet GFMA goals. Treat all such stands within 15 years. This may involve underburning; harvest, site preparation and planting; or other treatements.

Objective C: Within 5 years, treat 125 acres in mid-Mule Creek and upper Kelsey Creek to reduce risk of large scale wildfires.

Objective D: Conduct all commercial thin opportunities as they become available.

LAU Goal 3. Promote and enhance recreational opportunities.

Objective A: Construct camp sites, interpretive areas, trails and other recreational sites along the Kelsey Mule and Marial Roads.

Objective B: Develop 10 additional dispersed camp sites within the LAU within the next 5 years.

Objective C: Maintain all existing trails in good or excellent condition.

Objective D: Construct 5 miles of new hiking trails in the next 5 years where they would not conflict with other goals and objectives.

LAU Goal 4. Optimize elk habitat conditions within the Elk Management Area.

Objective A: Using the Wisdom Elk Model, maintain or attain habitat conditions to provide "highly viable" habitat effectiveness indices (ie. values $\geq$0.6).

LAU Goal 5. Maintain or improve water quality and fish habitat.

Objective A: Do not exceed watershed trigger point values as shown in Table 2.

LAU Goal 6. Maintain sustainable populations of all native wildlife and plant species.

Objective A: Provide habitat for at least 40 percent of optimum levels of cavity dweller wildlife species in the short and long term.

Objective B: Protect all raptor nests, bat roost sites and marbled murrelet sites to avoid disturbance or abandonment of the sites.

Objective C: Protect and manage special habitat features (meadows, springs, cliffs, caves, etc.) to maintain the integrity of these habitats.

LAU Goal 7. Special forest products

Objective A:

III. Riparian Reserves

LAU Goal 1.

IV. Connectivity Block

LAU Goal 1

V. Wild Rogue Wilderness Area.

LAU Goal 1. Cooperate with the Siskiyou National Forest to manage as Wilderness.

Objective A: Maintain existing access points in good to excellent condition. Improve Buck Point trailhead.

B. Target Landscape Pattern and Condition

V. Implementation Guidelines

This section will have management direction taken from the RMP, SEIS, as well as developed within the LA team.

VI. Actions needed to reach Landscape Goals and Objectives

A. Short Term

1. Inventory and monitoring needs..

Need to further develop these recommendations, expand list, determine methods, set priorities, establish plan for accomplishing the needed work

-Stream surveys for fish habitat condition
-Inventory stream class (perennial, intermittent)
-Riparian inventory on both fish and non-fish streams
-Status of young stands and management recommendations
-Ecological conditions and characterization of older stands
-Transportation management objectives (TMOs) for all roads
-Vegetation classiication (series, association)
-Inventory of special status species and associated habitats
-Inventory of special habitat features
-Vegetation and habitat inventory of Wilderness Area
-Assessment of recreational use of unit
-Set up permanent photo points
-Assess fire history (fire scars from stumps?)
-Inventory of commercial thinning opportunities
-Inventory of noxious weeds
-Inventory of special status plants and their habitats
-Water quality monitoring
-Assessment of elk numbers, movements and habitat use
-Quantitative lanscape analysis of older forests
-OTHERS????

2. Other possible management actions

Projects; resource specific
Monitoring plan by resource
Potential partnerships - private land owners, USFS, state
Timber sales
Development of special forest products program
Research needs
Others???

B. Long Term Actions to meet landscape objectives

VII. Implementation Time Line

Establish time frames, priorities, estimate budget and manpower needs, etc.

Appendix A-1. Landscape Flows within the Rogue Frontal West LAU

1-19-93

The Rogue Frontal West LA team examined and discussed the important flows within the unit. As a result of these discussions, the team decided to focus future analysis on the most important of these flows. For these analyses, the flows we will use are the following:

1. **People**

2. **Elk**

3. **Water/Fish/Riparian species (generally considered as a group)**

4. **Species associated with late successional forest habitat**

The team is writing a short paragraph describing these major flows within the unit. The first two, people and elk, could be mapped and a generalized map was developed. The second two did not readily lend themselves to a map, although water/fish/riparian flows obviously occur along streams which could be mapped from GIS.

The next step involved considering these four flows, along with a list of the important landscape elements identified in the first part of the report. The team decided that functional relationships between the major flows and elements, as well as relationships among the flow and among the elements, could best be discussed and presented in a narrative format. This narrative will be organized based on the four major flows. The team felt these relationships could be covered better and explained in more detail than could be handled in a few words in a table.

The overall list of flows within the RFW LAU included:

Soils - included sedimentation and slides
Water
Plants - long term movements of plants across the landscape
Anadromous fish
Resident fish
People
Fire
Air
Insects and diseases
Elk
Other wildlife (a long discussion about how to treat animals included potential groupings such as birds, mammals and herptiles; elk, deer, spotted owls, marbled murrelets, bear and cougar; species associated with old growth, species associated with early seral stages; wide ranging species, species with limited mobility).

Appendix A-2. Relationships between and among landscape elements and flows
Rogue Frontal West LAU 1-27-93

The RFW LA team identified four primary flows to consider for futher analysis. Also, from a long list of landscape elements we identified 20 of the most important elements for this unit. The relationships between these flows and elements were first explored using the following table. If some relationship did exist, its importance was categorized as either High, Medium or Low in terms of public concern or impact on managemen If there was no relationship, or if the flow and the element were the same, a dash was put in the table. The relationships considered "High" wei carried forward for further analysis and description in the "Relationships" section of the LAU report.

Relationships between Flows and Landscape Elements - Rogue Frontal West LAU

Landscape Elements	Flows			
	People	Water/ Fish/ Riparian	Elk	Late-Succession Species
Streams	L	-	L	M
TSZ Openings [1]	L	H	L	L
Riparian Zones	L	H	M	H
0-9 year seral stage	L	H	H	H
10-20 year seral stage	L	H	M	H
110-199 yr seral stage	L	H	M	H
200+ year seral stage	H	H	H	H
Clearcuts	L	H	H	H
Partial cuts	L	M	L	H
Anadromous Fish	M/L	-	-	-
Resident Fish	M/L	-	-	-
Water	M	-	-	L
Wilderness Area	H	H	L	H
Rogue River	H	H	L	H
Recreational Developments	H	M	H	L
Roads	H	H	H	M
Timber	H	H	H	H
Elk	H	M (Riparian)	-	L
Spotted Owls	L	L	-	-
Marbled Murrelets	L	L	-	-
People	-	L	H	L

Shaded blocks indicates functional relationships which are described in the narrative of the "Relationships" section.
Other significant relationships between elements which are not adequately displayed in the table include:
Timber/Transient Snow Zone Openings
Wilderness Area/Recreational Developments

---

[1] TSZ = Transient Snow Zone

GALESVILLE
Landscape Analysis Unit

DRAFT
3-21-94

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GALESVILLE 3-21-94
Landscape Analysis Unit
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GALESVILLE

DRAFT Landscape Analysis Unit DRAFT

I. Introduction

This paper provides overall guidance for ecosystem management of O&C and Public Domain lands within the Glendale Resource Area. The guidance has been developed using an interdisciplinary approach which includes Option 9 of the FEMAT, Upper Cow Creek Recreation Group and DCA plan. This information was used in concert with the resource management plan (RMP) for the 1990's. Resource specific objectives and constraints common to all lands were used in planning management actions within this analytical unit.

The term "goal" is used to express the long-range or desired future conditions. The term "objective" is used to express short-term measurable actions as related to resource issues.

II. Summary

The Galesville Landscape Analysis Unit LAU is located in southwest Oregon approximately 20 miles northeast of Glendale via Upper Cow Creek Road (Map). This unit is comprised of approximately acres in the Cow Creek watershed. BLM administers about 12,466 acres (percent) of which acres (percent) are on the Glendale Resource Area, acres (percent) on the Butte Falls Resource Area and acres (percent) on the Roseburg District; U.S. Forest Service, Tiller Ranger District, Umpqua National Forest administers about acres (percent); and acres (percent) in private ownership of which acres (percent) in industry ownership and acres (percent) in private ownership.

The ownership pattern is checkerboard. There is private individual land holdings, industry land holdings, U.S. Forest Service (Tiller Ranger District) and BLM (Roseburg District, Medford District [Glendale & Butte Falls R.A.]) land in the Upper Cow Creek Watershed. To the North is Roseburg District land and private land. To the East is Tiller Ranger District, USFS. To the South is Butte Falls R.A. and some of the Glendale R.A. To the west is part of the Glendale R.A. and private land.

The area encompasses drainages of Cow Creek above Galesville Reservoir. There are many residences within this unit. Major tributaries include McGinnies Creek, Negro Creek, Snow Creek Sugar Creek, Meadow Creek, Applegate Creek, French Creek, Dismal Creek, Beaver Creek and East Fork Cow Creek. The BLM portion of this unit has been divided into 6 watershed compartments for analysis, including areas of frontal drainages with small creeks draining directly into Cow Creek (Map). These compartments range from about 600 acres to about 4000 acres.

Up until 1958 the Public Lands contained primarily unmanaged forest timber. Timber harvesting in this LAU began around 1958, by tractor and ground lead methods. In the late 1970's, skyline systems were used. By the mid-1980's, most of the major road systems were complete in the area. During this time some of the second growth stands were managed for commercial thinning.

Annual precipitation for the unit ranges from 40 to 50 inches. Summer drought is common.

Riparian vegetation has been altered as a result of past harvest activities and subsequent damage resulting from storms which occurred in 1964 and 1974. The channels are stable at this point and will probably remain stable since harvest levels on private land are much lower than in the past.

This area is within the Klamath Province of southwest Oregon. Soils in the unit are derived from metasedimentary, metavolcanic and granitic rock types. Soils associated with metasedimentary rocks tend to be deeper and have more nutrients available. Soils developed from metavolcanic rock types tend to be shallow and have less nutrients and soil development than the sedimentary. Soils are poorly developed on granitic rock areas and are prone to extreme erosion if disturbed. Organics plan an increasing role in the productivity of the metavolcanic and granitic sites. Some of the unit is dominated by serpentine derived soils which are low in calcium and high in magnesium and other minerals which preclude many plant species which are adapted to calcium based soils (including Douglas-fir).

Vegetative communities within this unit vary by slope position, aspect, geologic type, and elevation. Vegetation on south aspects include mixed conifers and hardwoods, with the understory being typical of fire dependent species such as ceanothus and manzanita. North aspects support mixed conifers and hardwoods with understories of salal and rhododendron. Vegetation on soils derived from metasedimantary rock types contain a greater proportion of Douglas-fir. The size and growth rate tends to be greater on these soils than in metavolcanic derived soils. Granitic soils tend to support mixed conifers and are relatively productive if organics are un-disturbed. Site specific vegetative communities analysis needs to be assessed during prescription surveys since the area is geologically and geographically very complex.

Cow Creek above the city of Glendale is considered part of its municipal watershed.

A fiber optic telephone cable has been buried along the Snow Creek Road from Goolaway Gap to Upper Cow Creek road to McGinnis Creek Road and leaves the unit at the head waters of Shively Creek.

There is a communication site (BLM radio) on Cedar Springs Mountain.

The Upper Cow Creek Recreation Team is currently developing a recreation plan for this area considering campgrounds and hiking trails. This group consists of the Public, Douglas County, U.S.Forest Service, BLM and Oregon Department of Fish and Wildlife.

Several creeks are known to have resident trout.

There is a large quarry development on the upper end of Snow Creek.

There is a progeny test site located just north of Galesville Reservior (T.31S., R.4W., Sec.22). Numerous seed trees, both Douglas-fir and Sugar Pine, are scattered over the landscape. Scion collection trees are also present.

Cedar Springs Mountain, Red Mountain, part of Skeleton Mountain, Wildcat Ridge, and Galesville Reservior are some of the prominent features in the unit.

Deer are present throughout the unit. Elk are present, particularly in the Meadow and Snow Creek basins.

The data used for this report are contained in GIS files and maps, in Galesville files maintained in the Resource Area, U.S. Forest Service Files at Tillar Ranger District office and community files also maintained in the Resource Area.

III. ANALYTICAL UNIT DESCRIPTION - Landscape elements, flows, relationships.

A. Landscape elements - existing conditions

1. Vegetation

a. Vegetation Overview

Plant communities within the Galesville landscape unit are representative of the diversity encountered within the Klamath Mountains Province. The geologic and geographic features, in addition to climatic conditions, greatly influence the development of soils and vegetation. The mountainous terrain accentuates the landscape diversity. Extensive erosion has created steep canyons. Topographic features influence the natural disturbance patterns. Fire has disturbed the landscape frequently, and has played an extremely important role in the development of existing plant communities within the forests and meadows of the landscape unit. Within the last several decades, timber management activities have altered the landscape most drastically.

b. Plant Associations and Communities

A variety of plant communities and seral stages exist within the Galesville unit. This diversity is present throughout the network of riparian communities, upland forests, meadows, and rocky sites, including rock cliffs and talus slopes. Plant associations are generally based on potential vegetation (climax species) and site characteristics. Plant association classification work has not been completed in the landscape unit. However, the draft Medford BLM RMP EIS aggregated upland plant communities with similar characteristics into seven major plant community groupings. A plant community grouping is defined as an aggregation of plant associations with similar management potential, the same dominant late seral conifer species, and the same principle early seral species.

Galesville is part of the Douglas-fir/tanoak-madrone grouping. This grouping is characterized by evergreen hardwoods and shrubs which resprout after disturbance, persist in the stand, and constitute a major part of the climax association. In the early seral stage, grass and forbs are sparse. The plant community is dominated by resprouting tanoak, madrone, chinquapin, or other evergreen hardwoods and shrubs. Varnishleaf ceanothus is locally dominant on wetter sites and canyon live oak is prevalent on dry sites. Conifer species of the late seral stage include Douglas-fir, white fir, sugar pine, ponderosa pine, incense cedar, western red cedar, western hemlock, Port-Orford cedar, and pacific yew. Understory vegetation in the late seral stage may include species mentioned earlier, as well as rhododendron and salal. Tree form tanoak may be the climax species and would dominate the mature and old growth stages if fire could be excluded.

Smaller vegetation communities associated with riparian areas, meadows, rock outcrops, rock cliffs, or talus slopes occur within the defined major plant grouping. Meadow habitat is very limited in distribution within the LAU. Sites dominated by rock are common within upper reaches of the Cow Creek drainage. Riparian areas are extensive throughout the unit. Special status plant species are most likely to occur in these unique ecosystems.

Forested riparian zones are generally more complex than adjoining plant communities. The diversity of vegetation spans from plants submerged in water to species common in upland plant communities Annual and perennial plants and shrubs, as well as tree species mix, are likely to be more diverse than adjacent upland forests A higher occurrence of bigleaf maple, red alder, willow, and vine maple is likely in riparian areas.

c. Matrix, Patches, and Corridors

Matrix

The matrix is defined as the most connected portion of the landscape, expressed in terms of vegetation cover. Differentiation of the upland forests can be categorized by seral stages or age classes The draft Medford BLM RMP EIS described five seral stages for each major plant grouping: early seral, mid-seral, late seral, mature, and old growth/potential natural community. Acreage of age classes within the LAU are presented in Table . These seral stages are based on GIS age class distribution and do not take into account partial cutting and other modifications to stand structure

The matrix of the Galesville landscape is an older forest, a combination of both mature and old growth forests. Approximately percent of BLM acres, percent of USFS acres and percent of private land are 110+ years. Structure, species composition, and age distributions in the forest matrix varies from one part of the landscape to another, especially on opposing North/South aspects

South slopes appear to experience a higher intensity of fire disturbance than north slopes. These fires often consume varying amounts of vegetation, creating various sized openings within the burned areas. Frequently the stand is not completely reset to the early seral stage. Instead, inclusions of younger aged trees, both conifers and hardwoods, create multiple canopy levels within a mosaic of structural features and seral elements. Remaining large conifers generally have a patchy distribution, compared to north slopes which often have a more continuous canopy of larger coniferous trees.

The forest matrix can be further differentiated by classifying the older forest stands according to structural and functional features. The primary variable affecting the classification of the older forests within the Galesville landscape is the extent of partial cutting. Partial cut stands often lack the full range of structural and functional features found in stands without logging disturbance. For instance, partial cutting opens up the canopy, removes snags and down logs, removes hardwoods and can increase brush in the understory.

Partial cutting was common in roaded areas of the LAU. A relatively light partial cut or salvage entry was a typical harvest practice, particularly in drainages. In these stands approximately of the volume and most of the large snags were removed in the 1970's. These stands are now dominated by large conifers with a single, undifferentiated understory layer of brush and conifer saplings. Heaver partial cuts, similar to a shelterwood harvest, occurred in and a few other places. These stands consist of very widely scattered overstory conifers with an understory varying from patches of conifer reproduction and brush, to a mixture of predominantly hardwood trees and brush with limited distribution of conifer seedlings and saplings.

Patches

Patches were created within the matrix of older forest through clearcutting beginning in the 1950s. A pattern of rectangular shaped openings connected by a network of roads has been created in .
Naturally occurring patches also occur in the form of a few meadows, rock outcrops, talus slopes and brushfields. These occur primarily in the drainage, largely within the and in the small frontal basins. In addition, fire-induced patches within the matrix also frequently occur in unentered stands in and the small frontal basins. The results of these fire disturbances created both fine-grained landscape detail associated with under canopy fires, as well as blocks of even aged, Douglas-fir stands associated with catastrophic stand replacement fires. Within the LAU, naturally occurring late seral stage (age 50-109 years) Douglas-fir stands occur on approximately percent of BLM acres, percent of USFS acres and percent of private land.

Corridors

Corridors are landscape elements which connect similar patches and usually have high contrast with the surrounding matrix or aggregation of patches. Corridors facilitate flow of materials or organisms and can be man-made or naturally occurring.

Man made corridors are manifested by the network of roads within the LAU.

Riparian zones are naturally occurring corridors. Within the upper Cow Creek drainages, the forested riparian corridors provide connectivity for the fragmented blocks of older forest to the more intact older forests to the west.

Another significant natural corridor is the Cow Creek Canyon which runs through the middle of the LAU.

d. Important plant species

The bark of Pacific Yew contains taxol, which has been shown to be effective in treating some cancers. An interagency management plan has been developed for both these species.

Western red cedar is also considered to be an important species within this LAU due to its relative scarcity and the riparian areas in which it is found.

Sugar pine is a species of concern due to the prevalence of sugar pine blister rust. Very few seedling trees are surviving to maturity The BLM has initiated a genetics program to develop rust-resistant strains of sugar pine.

e. Special status plants

Special Status Plants observed within the Glendale RA and known to occur within each LAU are shown in Table . The fact that a check mark does not occur does not mean that plants do not exist, just that they have not been observed. Most LAUs have a chance of having all species on the table with the exception of Bensoniella. The only inventories have been in the form of clearances for timber sales and other projects.

The species which have been located within the LAU is Lewisia leana, associated with high ridges and serpentine soil. This species is an assessment species under the federal Endangered Species Act.

A list of detailed locations has not been developed by species.

f. Test / Experimental / Demonstration areas

Research programs with test sites within the Galesville unit include the Medford BLM district's tree improvement program.

In the 1970's, numerous Douglas-fir trees thought to be genetically superior in volume growth and form (based on phenotypic characteristics) were selected and identified. Each tree was tagged and painted. Glendale Resource Area records show locations of Douglas-fir "plus trees" in Galesville unit. In subsequent years, cones were collected from these trees. One of the purposes of these cone collections was to provide seed for progeny tests to evaluate the genetic value of selected parent trees.

One progeny test site is established in the L.A.U.:

Name	Year Planted	Location
Galesville		T.31S.,R.4W., SE1/4, Sec. 21

Seedlings planted at the progeny test sites are measured at regular intervals, usually every five years. The progeny measurement data is analyzed, and the selected parent trees are then ranked in order of desirability as sources of improved seed and for grafting in district seed orchards.

Sugar pine trees were tagged and painted under the Rust Resistant Sugar Pine program. The objective was to find and develop sugar pine that are sufficiently resistant to white pine blister rust disease so as to propagate resistant seedlings for use in the reforestation program. Medford district records indicate a total of sugar pine were selected as candidates in the L.A.U. Tree selection was completed in 1982. Cones were collected from several candidate trees through the 1980's and early 1990's. Some of these trees were screened during the 1980's by testing the seedlings grown from the collected seed. A total of candidate sugar pine located in the Galesville unit are currently known to have some rust resistance. Complete information regarding status of all candidate sugar pine trees is available from the tree improvement group of the district staff.

No information is available from the USFS on their progeny programs as of 2-16-94

g. Noxious weeds

Noxious and nonnative species are a serious threat to the natural biological community. The number of introduced species is growing and their range is spreading very rapidly as a result of increasing levels of human activities. Most species are prolific seed producers or develop extensive root systems that outcompete and exclude native species. A broader list of nonnative species exists than noxious weed species and exerts a more significant influence on the biological community than the species classified as noxious weeds.

Important means of introduction of noxious and nonnative species is through management activities such as road construction, pipeline construction, transportation of unclean tools and equipment from one geographic area to another, seeding of grasses and legumes, and other human activities. Agricultural crops, farm animals, and residential homes in the valley floors of the forest/rural interface are other key means of introduction and spread of noxious and nonnative plants. The Galesville watershed has a number of serious noxious weeds invasions as outlined in the list below.

The publication "A Guide to Selected Weeds of Oregon" by the Oregon Department of Agriculture, Noxious Weed Control Program, 1985 provides physiological description, habitat, vectors of dissemination, detrimental effects and economic impact along with color photos of the species. Additionally, O.D.A. Noxious Weed Control Program bulletin of 1993 describes the policy, classification system, the economic significance of noxious weeds and the O. D. A. Noxious Weed Rating system.

The above sources on the distribution of noxious and nonnative plant species are good reference information. Ken French, O.D.A. SouthWest Oregon Noxious Weed Control Program coordinator, located in Canyonville OR has additional site specific knowledge. Some additional locations are available from sightings obtained in the 1993 Stocking Survey and observant Resource Area personnel.

Currently, BLM has an agreement with ODA where locations of noxious weed invasions is identified and monitored by BLM and control measures are administered by ODA.

There are significant unmet needs relating to noxious and nonnative plant species in the Galesvill LAU. They include inventory by species, distribution, invasive mechanism, rate of spread and potential expansion; GIS mapping; and Monitoring.

h. Forest Health

This unit does not appear to have any major forest health concerns at this point. While diseases, insects, and other conditions occur, there is no apparent, widespread condition which would constitute a management concern. Some of the factors which have been observed within the LAU include: red ring rot (Phellinus pini), sugar pine blister rust, blackstain (Leptographium wageneri), other fungus infections, and various insects such as wood borers and bark beetles.

SPECIAL STATUS PLANTS OBSERVED IN GLENDALE R.A. 10/26/93

GENUS/SPECIES	GALES	MCOWN	MCOWS	WFCOW	ROGUEW	ROGUEE	GRAVEW	GRAVEE	HABITAT
Allium bolanderi bolanderi AS		✓							clay soils open woods
Allium bolanderi mirabile AS									clay soils open woods
Astragalus umbraticus AS		✓		✓			✓		open woods rich soils
Bensoniella oregana FC					✓				moist meadow and stream side
Camassia howellii FC								✓	serpentine soils
Cypripedium fasciculatum BS							✓		moist, heavy duff mix conifer forest
Fritillaria glauca AS			✓					✓	barren dry rock slope
Lewisia leana AS	✓								high ridges serpentine
Limnanthes gracilis gracilis BS							✓		wet ground serpentine
Mimulus douglasii AS									open gravel moist serpentine
Mimulus pygmaeus FC									damp sites open woods
Sedum moranii FC					✓	✓			rock outcrops serpentine
Silene hookeri AS									rock knolls serpentine

✓	indicates presence within LAU
AS	assessment species
FC	Federal Candidate
BS	Bureau Sensitive

NOXIOUS WEEDS - GALESVILLE LAU

GENUS/SPECIES	COMMON NAME	LOCATION	HABITAT	NOTES
Carthanus lanatus	Distaff Thistle	Douglas CO, Riddle	No known sites in Galesville area.	New Invader. Highest Priority
Centaura diffusa	Diffuse knapweed	Blackwell Hill/Rt 140-Greensprings Rd.	roadsides/ dry sites	High Priority. Small infestations. Manual or biological controls.
Centaurea maculosa	Spotted Knapweed	Butte Falls Progeny site.	good soils/disturbed areas	New invader. Highest priority. Herbicide control.
	Purple/Iberian Starthistle	No known locations in OR. Prevalent in Northern Cal.		New Invader.
Centaurea solstitialis	Yellow starthistle	Scattered populations/valley bottoms. Jackson, Josephine, Douglas Co.	Wide range-roadways/ dry sites.	High priority. Bio-control measures. Seeds.
Chondrilla juncea	Rush skeletonweed	Scattered locations. rather common. Douglas, Josephine Co.	Disturbed areas/ roadways.	Bio-control - Mite/midges/ rust. Seed & roots.
Cirsium arvense	Canada Thistle	Everywhere. Perennial	Wide range of conditions	Bio-control. Low effectiveness (Urophora carduii). Seeds/roots
Cirsium vulgare	Bull Thistle	Most clearcuts	Wide range of conditions	Bio-control (Urophora stylata) Insects available in May. Seed producer.
	Spanish Broom	Rogue River and Ashland.		New Invader. No leaf. No bio-control agents.
	French Broom	Cow Cr area.		New Invader. Larger leaf sp.
Cytisus scoparius	Scotch broom	Brushy Gulch/Wolf Cr.	Good soils/ disturbed area	Biological control. Roadways/seed producer. 3 Million acres.
Euphorbia esula	Leafy spurge	No known sites.	Streams/ open areas.	High priority. New invader. Seed producer/roots
Hypercium perferatum	Klamath Weed	Very common. All drainages.	Wide range of conditions.	Low priority. Bio-control - very effective. (Chrysallina Beetle).
Isatis tinctoria	Dyers woad	Gravel bars. Jackson/ Josephine Co.	Sandy/gravel soils.	Low priority. Seeds.
Lythrum salicaria	Purple loosestrife	No known sites. S.Umpqua/ Rogue River.	Riparian/ wetlands.	New species. Bio-control. No chemical control. Seed/rhizomes
Senecio jacobaea	Tansy ragwort	Fringe of Range. Jackson, Josephine, Douglas Co.	Wide range of soils.	Moderate priority. Effective Bio-control. (Cinnabar moths/ Flea beetle) /seeds.
Sorgham haepense	Johnson grass	Douglas, Josephine Co.	Roadsides/ good soils.	Low priority. Seed/roots. Ag/roadways.
Taeniatherum caput-medusae	Medusahead rye	Everywhere.	Pasture/open forest	Low priority. Seed producer
Ulex europaeus L.	Gorse	Scattered sites in vicinity, north and west of Glendale.	Good soils. Moist.	Potential for invasion. Dense thickets. Flammable.

i. Forest Products

Major economic important species found within the Galesvale LAU consist of the following:

Douglas-fir (Pseudotsuga menzeisii)
Incense Cedar (Libocedrus decurrens)
Ponderosa Pine (Pinus ponderosa)
Sugar Pine (Pinus lambertiana)
Western Red Cedar (Thuja plicata)
White Fir (Abies concolor)
Western Hemlock (Tsuga heterophylla)
Knobcone Pine (Pinus attentuata)
Port Orford Cedar (Chamaecyparis lawsoniana)
Pacific Yew
Grand fir
Shasta Red fir
Tan oak
Chinkipin
Madrone
White oak
Black oak
bear grass
huckleberry
various species of mushrooms

There are approximately 12,466 acres of BLM administered land and acres of USFS administered land withdrawn from intensive timber management within the LAU. Within the general forest matrix identified in Option 9 there are about acres of withdrawn land; comprising about percent of this allocation. The majority of these acres were withdrawn due to rocky and fragile soils which preclude successful replanting.

The standing timber is basically high quality, large log, old growth. The estimated acres and volume of standing timber per age class, based on the 5 point inventory plots on BLM land, is as follows:

Age 0-9	2002 Acres	16%	Est. Vol.	bf.
Age 10-19	687 Acres	5%	Est. Vol.	bf.
Age 20-49	1739 Acres	14%	Est. Vol.	bf.
Age 50-109	1115 Acres	9%	Est. Vol.	bf.
Age 110-199	3829 Acres	31%	Est. Vol.	bf.
Age 200 +	3094 Acres	25%	Est. Vol.	bf.

Total Glendale RA. acres is approximately 12,466. Other ownership in the LAU total approximately 35,360 acres. Total acres in the LAU is approximately 47,800.

Total estimated commercial volume: billion bf.

There are permanent 5-point inventory plots on BLM land within the LAU. This number is not considered adequate to give a true estimate of the volume within the LAU. This is however, the only information available at this time. A map showing the approximate locations of the 5 point inventory plots is available in the files.

There are an estimated acres available for commercial thinning within the LAU. This figure is based on stands within the 20-80 year age class.

j. Special Forest Products

MAJOR PRODUCTS

Beargrass (Xerophyllum tenax) : This member of the Lily family appears throughout the areas at nearly all elevations, establishing itself after fire and other disturbances, and flourishing under 50-75% canopy closure, moderate rainfall, and poor to moderate sites.

Seasonal decorative tree boughs: The dominant species within the LAU include: incense cedar (Libocedrus decurrens), sugar pine (Pinus lambertiana), and ponderosa pine (Pinus ponderosa). Occurring in lesser amounts but of higher value are Port-Orford cedar (Chamaecyparis lawsoniana) and western redcedar (Thuja plicata). Douglas fir (Pseudotsuga menziesii) while occurring in great amounts has little value when used as bough decoration.

Christmas trees: Historically, the Galesville LAU has not been a significant source of Christmas trees because of the distance from any major community and lack of suitable type of trees.

Mushrooms: The unit is in the appropriate range for all of the wild mushrooms deemed commercially valuable. They include: chanterelle (Cantharellus cibarius), morel (Morchella conica and Morchella esculenta), matsutake (Armillaria ponderosa and Tricholoma matsutake), bolete (Boletus edulis and others), and hedgehog (Dentinum repandum). There has been no inventory for these species. There have been few commercial permits in the past, but increased interest could lead to greater activity.

Firewood: Firewood is an important product in the unit for both personal and commercial purposes. Slash, leftover from cutting activities, is the primary source of material and therefore firewood abundance is related to cutting occurrences. Pacific madrone (Arbutus menziesii), tanoak (Lithocarpus densiflorus), golden chinkapin (Castanopsis chrysophylla), California black oak (Quercus kelloggii) are the species of choice among the hardwoods. Douglas fir, any pine, cedar, or other conifer are much less desirable but would be taken when no hardwoods are present. All of these species are abundant in the LAU.

Other Wood Products: Other potential forest products include: decorative wood, burls, furniture, toys, and other specialty products. Primarily, the hardwoods are used, especially Pacific madrone (Arbutus menziesii), tanoak (Lithocarpus densiflorus), golden chinkapin (Castanopsis chrysophylla), California black oak (Quercus kelloggii) as well as bigleaf maple (Acer macrophyllum), manzanita and Pacific yew (Taxus brevifolia). Other products coming from conifers, such as posts, poles, shakes, etc. are also present.

Recently large quantities of Pacific yew bark has been sold to a narrow market for research purposes. It is likely that more bark will be sold in the future. This tree occurs throughout the LAU.

Other forest products: Special forest products are quite diverse. Within the Galesville LAU, there have been permits sold for evergreen huckleberry (Vaccinium ovatum), and salal (Gaultheria shallon). In the future, there will likely be permits sold for prince's pine (Chimaphila umbellate), vine maple (Acer circanatum), herbs (too numerous to mention), ferns, Pacific rhododendron (Rhododendron macrophyllum), dwarf Oregongrape (Berberis nervosa), and mosses, all of which occur in large amounts in the Glendale R.A.

2. Wildlife and Fish

a. General Wildlife Habitat Condition

The Upper Cow Creek LAU unit has a variety of wildlife habitats, with relatively small areas of old growth habitat in the BLM portion of the landscape.

Old growth habitat is scarce within the BLM portion of the landscape and includes some small-to-mid size blocks. Block size of old growth patches ranges from only a few acres to a few hundred acres of habitat older than 200 years. There are no patches of contiguous old growth habitat in the BLM portion.

Connectivity between patches is also of low quality in the BLM portion of the LAU. Checkerboard ownership and past clear cutting of forest stands are major reasons for this condition.

Habitat for snag-dependent species has been severely reduced in the BLM portion of the landscape, mainly by clearcutting and salvage harvest practices. The same is true for species associated with down logs. In the BLM portion of the LAU, snag and log habitat remains scarce, averaging only about 30 percent of optimum population levels for woodpeckers.

Galesville Reservoir provides a food source for many animal species, including osprey, Canada geese and other waterfowl, deer and many other species. The standing trees in the reservoir provide bass habitat and western pond turtle habitat.

Much of the landscape consists of steep, forested and/or brushy terrain, which provides habitat for neotropical birds, deer, elk, cougar and many other wildlife species. The bottom farmlands provide forage and refuge for elk and deer. Accipiter species forage in the farm fields as well

Since only a handful of wildlife species have been inventoried in this area, little or nothing is known about the wildlife habitat condition for most of the animals and birds in the LAU.

b. Special Status Species

The following paragraphs describe the current management, specific concerns and management opportunities for the species listed. The Bureau of Land Management is required to assess for those species which are listed. Much of the following species and habitat information was taken directly from the Analysis of the Management Situation (Interior, 1991). Other wildlife management opportunities can also be found there See the attached list (Table) of Special Status Species on the Medford District.

Table . Special Status Animal Species - Galesville LAU.

Table SPECIES (common name)	STATUS	PRESENCE	MONITORING LEVEL
Peregrine Falcon	FE,ST	U	1
Gray Wolf	FE, ST	A	1
Bald Eagle	FT, ST	S	1
Northern Spotted Owl	FT, ST	D	4
Marbled Murrelet	FT, ST	A	1
Jenny Creek sucker	FC	A	1
Redband trout	FC, SV	A	1
Western Pond Turtle	FC, SC	D	3
Del Norte Salamander	FC, SV	U	1
Siskiyou Mountain salamander	FC, SV	A	1
Cascades Frog	FC, AS, SC,	A	1
Mtn. Yellow-legged frog	FC, SU	U	1
Red-legged Frog	FC, SU	U	1
Spotted Frog	FC, SU	A	1
Northern Goshawk	FC, AS, SC	S	1
Loggerhead shrike	FC	A	1
Mountain Quail	FC	D	1
Townsend's Big-eared Bat	FC, SC	U	1
White-footed Vole	FC, SP	U	1
Fisher	FC, AS, SC	U	1
Wolverine	FC, ST	A	1
Burnell's False Water Penny Beetle	FC	U	1
Denning's Agapetus caddisfly	FC	U	1
Green Springs Mtn. farulan caddisfly	FC	U	1
Schuh's homoplectran caddisfly	FC	U	1
Obrien rhyacophilan caddisfly	FC	U	1
Siskiyou caddisfly	FC	U	1
Alsea ochotrichian micro caddisfly	FC	U	1
Franklin's Bumblebee	FC	U	1
Oregon pearly mussel	FC	U	1
Fringed Myotis	BS, SV	U	1
Clouded salamander	AS, SC	U	1
Tailed Frog	AS, SV	U	1

Table SPECIES (common name)	STATUS	PRESENCE	MONITORING LEVEL
Black Salamander	AS, SP	A	1
California slender salamander	AS, SP	A	1
Olympic salamander	SV	D	1
California Mountain King Snake	AS, SP	U	1
Common King snake	AS, SP	U	1
Pileated Woodpecker	AS, SC	S	1
Lewis Woodpecker	AS, SC	U	1
White-headed Woodpecker	AS, SC	A	1
Black-backed Woodpecker	AS, SC	U	1
Three-toed Woodpecker	AS, SC	U	1
Flammulated Owl	AS, SC	U	1
Burrowing Owl	SC	A	1
Purple Martin	AS, SC	U	1
Yellow-billed cuckoo	AS, SC	A	1
Pacific pallid bat	AS, SC	U	1
Pine marten	AS, SC	U	1
Great Gray Owl	AS, SV	U	1
Greater sandhill crane	AS, SV	A	1
White pelican	AS, SV	U	1
Western Bluebird	AS, SV	U	1
Pygmy nuthatch	SV	U	1
Acorn Woodpecker	SU	U	1
Williamsons sapsucker	SU	A	1
Pygmy owl	SU	S	1
Bank swallow	SU	A	1
Ringtail	SU	U	1

Status:
FE - Federal Endangered
FT - Federal Threatened
FP - Federal Proposed
FC - Federal Candidate
BS - Bureau Sensitive
AS - Assessment Species (BLM)
SE - State Endangered
ST - State Threatened
SC - ODFW Critical
SV - ODFW Vulnerable
SP - ODFW Peripheral or naturally rare
SU - ODFW Undetermined

Presence:
D - Documented
S - Suspected
U - Uncertain
A - Absent

Monitoring Level:
N - No surveys done
1 - Literature search only
2 - One field search done
3 - Limited field surveys done
4 - Protocol completed

Bald Eagles

Management History

Bald eagles have been occasionally sighted flying above the Galesville Reservoir area, yet no nests have been found. In the early part of 1992, two eagle "un-nest" structures were constructed within a mile of Galesville Reservoir. These structures are currently being monitored. The Resource Management Plan has reserved 30 acres in the Galesville Reservoir area for a potential bald eagle nesting stand.

Specific Concerns

The bald eagle is a federal and state listed threatened species in the state of Oregon.

Management Opportunities

Avoid human related disturbances within 1/2 mile of all active nest sites in the LAU between February 1 and August 15.
Retain land with bald eagle habitat.
Do not use chemicals for insect or disease control on the bald eagle management lands.
Manage streams, riparian areas and uplands to enhance anadromous fisheries.

Conduct ongoing bald eagle inventories in the LAU area, especially around Galesville Reservoir.

Western Pond Turtles

Management History

Western Pond turtles have been found in Galesville Reservoir. There is no specific management direction for this species.

Specific Concerns

The western pond turtle is believed to be declining throughout it's range. The causes stem from "habitat alteration, both directly on aquatic habitats and elimination of terrestrial nesting sites; introduced predators, notably bullfrog and bass; predation on hatchlings and juveniles; direct and indirect predation by humans through wanton shooting, pet trade collecting, and capture and harvest by fishermen for food; drought, population fragmentation and disease" (Marshall,1992).
Require seasonal road closures within 500 feet of any known population of turtles.
The status of pond turtles in the LAU area is presently unknown.

Management Opportunities

Conduct inventories for this species to determine present status and population in this area.
Control or eliminate introduced fishes and bullfrogs in ponds and streams where the turtles are found.

Northern Goshawk

Management History

There are no inventories for this species or their habitats in the LAU.

Specific Concerns

Goshawk numbers appear to be decreasing throughout the bird's range. Timber harvest removes habitat for this species.

Management Opportunities

Conduct inventories to determine goshawk status in the area.
Avoid human disturbance within 1/4 mile of any nest areas between March 15 and August 15.

Mountain Quail

Management History

This is a game species and receives a moderate level of public interest. The Oregon Department of Fish and Wildlife conducts annual brood counts throughout its planning region. Clear- cutting in the past has benefitted quail by creating more open habitat. There is no specific management direction for this species.

Specific Concerns

This species is listed as a candidate 2 species, but seems to be thriving throughout the LAU area.

Management Opportunities

Conduct ongoing inventories to confirm population numbers.

Dominant Woodpeckers

Management History
Dominant woodpeckers (here we consider downy, hairy and pileated woodpeckers, the common flicker and the red breasted sapsucker) are of high interest to the public.

No field inventories have been conducted for the above-mentioned species.

Woodpecker Model

The Resource Management Plan for the Medford District, Bureau of Land Management, addresses what is called the "Dominant Woodpecker Model". This is used to analyze current forest stand conditions in the Glendale Resource Area portion of the LAU for snags. (See Table****).

The target for woodpeckers in the RMP Preferred Alternative is to provide for 60 percent of optimum population levels over time. However, only 3 sections of BLM land (and no private land) currently meet this target, as illustrated on the Woodpecker Model table.

The target for woodpeckers in the SEIS is to provide for 40 percent of optimum population levels over time. Currently, in this LAU, of which the BLM portion is Late Successional Reserve, 11 sections (or 32 percent) currently meet this target.

Specific Concerns
The pileated woodpecker is considered a sensitive species by Oregon Department of Fish and Wildlife.

Habitat for cavity dwellers has been declining due to past timber harvest practices. The primary impacts to the habitat of woodpeckers is the removal of snags and removal of the forest surrounding the snags. Removing these snags directly reduces available habitat for these birds. Removing green trees eliminates future large snags in subsequent stands.

Management Opportunities
Conduct surveys to establish habitat relationships and to develop an index of pileated woodpecker population numbers within the LAU.

Pygmy Owl

Management History
There is no specific management direction for this species.

Specific Concerns
None.

Management Opportunities
Conduct surveys to verify population densities in the LAU.

Roosevelt Elk

- Create and Refer to map showing elk area
- Describe the status of the elk inside and outside of the LAU
- Describe the habitat status

Management History
This game animal has received much attention in the past, by private landowners as well as by BLM personnel. The BLM has designated a portion of the LAU as a big game management area. Roads have been closed for elk sanctuary, and many acres of BLM land have been seeded to provide elk forage.

Specific Concerns
RUN ELK MODEL?

Management Opportunities
Pursue land exchanges to block up ownership in priority elk habitats.
Initiate elk telemetry studies in the LAU
Create elk foraging habitat and hiding cover

Osprey

Management History
Osprey nesting platforms have been erected for these birds around Galesville Reservoir. Snags are left at nesting sites where they do not pose a safety hazard. Road construction and recreation development near nest sites are avoided.

Specific Concerns
Osprey are sensitive to suitable nest trees and to fish population fluctuations which are affected by water quality and other factors which reduce fish availability.

Management Opportunities
Maintain a 5 acre core area around each of the existing nest trees to maintain the nest trees and perch trees.
Maintain a minimum of four blocks of at least 20 acres each of mature and old growth seral stage habitat suitable for future nest establishment within 1/2 mile of Galesville Reservoir.
Install additional nest platforms to improve nesting opportunities. Conduct annual occupation and reproduction surveys.

Spotted Owls

There are two active spotted owl sites known within the landscape unit. Inventories have been fairly thorough in the BLM portion of the LAU, but are unknown in the Forest Service portion of the unit. Other sites might be found with higher intensity inventory. There are approximately 3199 acres (GIS generated) of suitable owl habitat in the BLM portion of the landscape unit (Table 2 and Map 1). Not all of these stands have been surveyed on the ground to determine if they are indeed owl habitat.
Table *** shows the owl sites, their current pair and reproductive status, which are monitored annually in the LAU. For the past *** years, this LAU has been surveyed for spotted owls, in known owl sites as well as in proposed management activities, such as timber sales.

There are approximately 3199 acres of suitable owl habitat in the BLM portion of the landscape unit (Table and Map). Some of these stands still provide suitable habitat and others may not. The value and functions of these partial cut stands as owl habitat is uncertain. As this portion of the LAU is in Late Successional Reserve, the low percentage of owl habitat (26%) is of concern and efforts should be made to generate old-growth stand conditions as soon as possible. This should be a high priority for future projects in this area. Efforts such as tree thinnings should be prioritized in areas where they are needed most and will provide the best spotted owl habitat in the least amount of time.

Table***lists the unit acreage and suitable spotted owl habitat located within designations such as Designated Conservation Areas (DCAs) from the Draft Recovery Plan for the Northern Spotted Owl, Old Growth Emphasis Areas (OGEAs) from the RMP, and Late Successional Reserves (LSRs) from Option 9 of the President's Plan.

Table Suitable spotted owl habitat within the Galesville LAU on BLM land.

Designation	Suitable Owl Habitat Acres	Total BLM Acres
OGEA	3199	12466
LSR	3199	12466
FOREST MATRIX (Option 9)	0	0
CRITICAL HABITAT	3199	12466
TOTAL	3199	12466

There are 12,466 acres designated as critical habitat for spotted owls within the LAU (Map). Approximately 3199 acres (26%) of this critical habitat is considered suitable spotted owl habitat. There are essentially no matrix forest lands in the BLM portion of the Galesville LAU

Spotted owl dispersal habitat is generally considered adequate for ensuring successful movement of young birds away from their natal areas and locating potential new core areas. There are portions of 7 quarter townships located within the Upper Cow Creek unit. Most quarter townships are below the 50-11-40 standard for dispersal habitat (Table). In five quarter townships the forest has been clear cut to the point where less than 50 percent of BLM ownership contains adequate dispersal habitat. This is important since only about 26 percent of the BLM lands in this LAU contain owl habitat. This decreases the liklihood of spotted owl population dispersal and growth in the area.

Table . Spotted owl dispersal habitat condition on BLM lands for quarter townships within the Galesville LAU.*

Quarter Township	Total BLM Acres in quarter township	Percent BLM Acres in Dispersal Habitat	BLM Forest Acres above <below> 50-11-40 standard
31S-03W-SW	1105	14	<96>
32S-03W-NW	1647	48	68
32S-03W-SW	208	82	53
31S-04W-SW	1977	0	<18>
31S-04W-SE	2859	0	<52>
32S-04W-NE	3441	0	<23>
32S-04W-SE	3788	0	<29>

* The numbers presented are current as of October, 1991. They exclude acreage within the old HCAs, but have not been re-analyzed to reflect the newer versions of reserves, such as LSRs.

OWL SITE	1993 PAIR STATUS	1993 REPRODUCTION STATUS	1 st YEAR DETECTED	LAST YEAR DETECTED
Meadow Creek	NS	-	1990	1991
Negro Creek	AP	NY	1980	1993
Snowy Owl	AP	Y	1991	1993
Ump Cow	NS	-	1978	1978

1993 Pair status	1993 Reproductive status
AP - Active pair site	Y - Young produced/fledged
RS - Resident single	
UP- Unoccupied site	NY - No young produced
NS - No longer viable	

Marbled Murrelet

Marbled Murrelets have been found as far inland as 50 miles from the coast. They generally nest in old forest stands on large, moss-covered limbs. The lands along the coast have been split into bands of varying distances from the ocean. None of the LAU is within the 50 mile distance of the coast. No inventories have been conducted within the unit.

Other Special Status Species

Goshawks have also been sighted and probably nest throughout the Galesville unit in older forest stands. No inventory has been conducted.

c. Special or unique habitats - Meadows, cliffs, wet meadows, etc.

There are large areas of cliff and rock outcrop habitat throughout the upper area and in places along Cow Creek. Many of these areas have not been inventoried or characterized as wildlife habitat.

There are a few man-made ponds and pump chances throughout the unit and one man-made Reservoir. Galesville Reservoir contains western pond turtles.

There are some areas of meadow habitat located within the landscape unit, mostly in the bottom farmlands (Map __).Cave habitat is limited in the Upper Cow Creek unit.

The are some mine adits in the LAU area, but little is known of their wildlife habitat potential. These adits have not been surveyed for bats or other wildlife.

d. Fisheries Resources

Distribution and Status

The Galesville LAU provides approximately ______ miles of stream habitat for resident cutthroat and rainbow trout (Table .).

Table . Miles of Resident Salmonid Habitat in the Galesville Landscape Analysis Unit

Subwatershed		Anadromous	Resident
Number	Name		
	McGinnies Creek		
	Negro Creek		
	Sugar Creek		
	Snow Creek		
	Meado Creek		
	Ike Butte Creek		
	Dismal Creek		
	French Creek		
	Applegate		
	Devil Creek		
	E. Fork Cow Creek		
	Cow Creek above E. Fk. Cow Creek		
	Beaver Creek		
	Galesville LAU TOTALS		

Inventory

Stream and reservoir environments in the LAU provide habitat for 14 species of endemic and introduced fish species (Tables * and *). Of the *** miles of streams second through seventh order within the LAU (Table *) ** miles support fish. Winter steelhead and coho salmon are the species of major economic importance. ODFW manages fish populations in the LAU in accordance with the state wild fish policy (ODFW 1992).

ODFW traps adult coho salmon and winter steelhead at the base of Galesville Dam and transports eggs to the Rock Creek Hatchery on the North Fork of the Umpqua River for incubation and rearing. ODFW releases about 60,000 smolts of each species per year into Cow Creek as mitigation for habitat lost from dam construction. Adult coho excess to hatchery needs are released upstream of the dam to spawn naturally in Cow Creek and its tributaries. Life history and habitat requirements of their landlocked progeny are poorly understood; the extent that they utilize the reservoir and streams on public land for rearing and spawning is unknown. General life history and habitat requirements of winter steelhead, coho salmon and cutthroat trout are described in the district's planning documents. Detailed information on stream and riparian condition has not been collected.

Coho salmon in the South Umpqua River system are a state "stock of concern", an informal precursor to formal listing as "sensitive" (Weeks 1993). The American Fisheries Society considers Umpqua River coho salmon to be at moderate risk of extinction (Nehlsen, et al. 1991).

Effects of Land Use Activities On Aquatic Habitat

Fish habitat in some streams is severely degraded. Use of water for agricultural and domestic purposes through ground and surface water withdrawals has dewatered streams or increased water temperatures in the upper portion of Cow creek and Applegate Creek on private land. Timber harvest-related activities have adversely affected aquatic habitat throughout the LAU. Riparian protection, as well as road construction and tractor logging practices on public land generally conform to higher standards than on other ownerships. Livestock grazing and feedlots on private land, especially on Cow Creek, has removed riparian vegetation and destabilized streambanks. Livestock grazing is not authorized in the LAU. Medford District planning documents present a thorough discussion of stream ecology in forested watersheds and its relationship to fish production.

Completion of Galesville Dam in 1986 blocked passage of steelhead and coho salmon to important spawning areas upstream of the dam, including Snow Creek. McGinnis, Negro, Meadow and Sugar creeks provided marginal anadromous fish spawning and rearing habitat prior to dam construction. Regulated streamflow from the dam has appreciably improved migration conditions for adult salmon and steelhead in Cow Creek during late fall. Juvenile coho and steelhead rearing in Cow Creek benefit from the dam's multi-level outlet structure, which releases 40 cfs of 50 to 60F water to Cow Creek during summer months.

Current Management Direction

The Medford District's primary means of habitat protection involves retaining riparian management areas along streams, ponds and wetlands, providing fish passage at road crossings and implementing other best management practices where appropriate (USDI BLM MDO 1992).

Logs, rootwads and boulders, have been added to portions of Quines, Bull Run and Whitehorse creeks to benefit steelhead, coho and cutthroat trout. Project monitoring in Quines Creek indicates that juvenile coho and steelhead are as much as four times more abundant per square meter of improved habitat during late summer than in untreated stream segments. Additional habitat improvements are planned for these streams. Index areas for spawning escapement of winter steelhead and coho salmon have been established on Whitehorse, Hogum and Bull Run creeks to help determine population trends.

Table . Fish Species Occurrence In the LAU

	COW CREEK	GALESVILLE RES.	McGINNIS	MEADOW	NEGRO	RUSSELL	SNOW	SUGAR
Fall Chinook [1]	X							
Coho Salmon [1]	X	X						
Winter Steelhead [1]	X							
Cutthroat Trout[1]	X	X	X	X	X	X	X	X
Rainbow Trout		X						
Small-mouth Bass	X							
Large-mouth Bass		X						
Bluegill Sunfish		X						
Redside Shiner	X	X				X	X	
Coarse-scale Sucker [1]	X	X						
Umpqua Squaw-fish [1]	X	X					X	
Pacific Lamprey [1]	X	X			X	X		

	COW CREEK	GALESVILLE RES.	McGINNIS	MEADOW	NEGRO	RUSSELL	SNOW	SUGAR
Sculpin (sp) [1]	X	X	X	X	X	X	X	X
Speckled Dace [1]	X	X	X		X	X	X	
Miles with Fish [2]	13.5	N/A	2.3	3.6	3.8	1.8	10.2	2.0
Total Stream Miles [2]	54.9	N/A	6.0	18.8	9.9	7.6	40.1	9.2

[1] Endemic
[2] Stream orders 2 through 7, based on WODDB

Table

Salmonid Distribution Within the LAU (Miles)

Stream Name	Cobo Salmon	Winter Steelhead	Resident Cutthroat Trout
Cow Creek	7.8	7.8	13.5
Galesville Reservoir	Present	Absent	Present
McGinnis Creek	0	0	2.3
Meadow Creek	0	0	3.6
Negro Creek	0	0	3.8
Snow Creek	0	0	10.2
Sugar Creek	0	0	2.0
Ike Butte Creek			
Dismal Creek			
Applegate Creek			
Devil Creek			
French Creek			
Beaver Creek			
East Fork Cow Creek			
Cow Creek Above East Fork			

Table 3. Stream Mileage in the BLM portion of the LAU

Stream Order	Miles
2	158
3	69
4	37
5	8
6	7
7	13

Habitat Condition

The landscape unit has a variety of wildlife habitats, with some patches of older forest stands scattered throughout the area. Much of the land is in early seral forest stages, pastures and cultivated farm land. The BLM lands are arranged in a checkerboard pattern. All BLM acres are within designated spotted owl critical habitat, a Designated Conservation Area (DCA) and a Late Successional Reserve (LSR) (See Table).

Large portions of forested private and Public lands have been harvested, resulting in a reduced number of mature or old growth forested stands, and poor connectivity between stands. In some instances, stands in the Landscape Analysis Unit are in a process of breakup with some mortality of larger trees, and limited understories. This results from natural as well as man made changes. Additional mortality is possible in the future due to insect attack or catastrophic fires (Interior, 1992).

Streams in the landscape unit have some of the best water quality in the Medford District because of their remoteness, geology and hydraulic character. Areas disturbed by mining activities from 1850-1930s are well vegetated and have no water quality concerns.

There has been extensive timber harvest and road construction in the upper Cow Creek basin. Harvest has disturbed riparian habitat along small, non-fishery headwater streams by removing future sources of downed large woody debris and drastically reducing structural diversity. Future consequences of this activity may be accelerated routing of sediment from roads to streams and downcutting of small, steep stream channels. Inventories of upper mainstream Cow Creek and it's tributaries have not been conducted. But due to the high road density it is probable that sediment may be limiting aquatic productivity in some locations.

Cow Creek and Galesville Reservior are the primary fish-bearing areas in the landscape unit. Streams in the landscape unit drop quickly to Cow Creek through steep, narrow, bedrock canyons. These conditions tend to provide cool, well-oxygenated water despite of the streams' north-south orientation. High velocity flows in these streams during the wet season, especially in their mid and lower reaches, prevent formation of many suitable spawning areas, limit the area that is available for juvenile salmonids to escape high water velocity and also prevent accumulation of large woody debris, an important component of quality fish habitat. High velocities scour sediment from streambed gravels but also largely prevent periphyton and aquatic insects from colonizing rock surfaces.

Stream habitat conditions is displayed in Table . Stream condition is based on riparian condition (Table - Watershed section), but also includes subjective evaluations of stream band stability, amounts of disturbance, influence of roads and other sources of sediment, effects of sensitive soils areas, large woody debris in the stream channel, future sources of wood from riparian and upland areas and other factors. Approximately __ percent of all streams are in good condition.

Table describes the general condition of fish habitat in each landscape unit, along with perceived causes for degraded habitat. Detailed information on the condition of key components of fish habitat (i.e. flow, water temperature. pool depth and instream cover) have not been collected for any stream in the landscape unit.

Table . Fish Habitat Condition - Galesville LAU

Stream	Condition[1]	Factors Limiting Potential Stream Productivity[2]
Cow Creek to E. Fork Cow Creek		
McGinnis Creek		
Negro Creek		
Sugar Creek		
Meadow Creek		
Snow Creek		
Ike Butte Creek		
French Creek		
Dismal Creek		
Applegate Creek		
Devil Creek		
Beaver Creek		
East Fork Cow Creek		
Cow Creek Above East Fork Cow Creek		

[1] P = Poor, F = Fair, U = Unknown

[2] T = Timber harvest-related (i.e., timber harvest near streams, soil erosion from roads or from tractor logging)
M = Historical or current placer mining

A = Agricultural practices
I = Industrial discharges
R = Road location
W = Water diversion

Habitat Improvement Activities and Monitoring

There have been no aquatic habitat improvement projects within the LAU.

A monitoring program for macroinvertebrates has been initiated in at the mouth . The intent is to sample aquatic macroinvertebrates now and then sample again at five year intervals. No data from this monitoring is available yet.

3. Soils

Soils in the unit are derived from metasedimentary, metavolcanic and granitic rock types. Soils associated with metasedimentary rocks tend to be deeper and have more nutrients available. Soils developed from metavolcanic rock types tend to be shallow and have less nutrients and soil development than the sedimentary. Soils are poorly developed on granitic rock areas and are prone to extreme erosion if disturbed. Organics plan an increasing role in the productivity of the metavolcanic and granitic sites. Some of the unit is dominated by serpentine derived soils which are low in calcium and high in magnesium and other minerals which preclude many plant species which are adapeted to calcium based soils (including Douglas-fir).

Vegetative communities within this unit vary by slope position, aspect, geologic type, and elevation. Vegetation on south aspects include mixed conifers and hardwoods, with the understory being typical of fire dependent species such as ceanothus and manzanita. North aspects support mixed conifers and hardwoods with understories of salal and rhododendron. Vegetation on soils derived from metasedimantary rock types contain a greater proportion of Douglas-fir. The size and growth rate tends to be greater on these soils than in metavolcanic derived soils. Granitic soils tend to support mixed conifers and are relatively productive if organics are un-disturbed. Site specific vegetative communities analysis needs to be assessed during prescription surveys since the area is geologically and geographically very complex.

Soils in the Galesville LAU consist mainly of Beekman-Vermisa Complex and Josephine/Speaker Series. Vermisa soils are shallow soils, less than 20 inches, and found in conjunction with steep slopes and ridge tops. Due to the shallow nature of the soil rooting depth of plants is restricted. Josephine/Speaker soils are generally found on slopes less than 60%, and are relatively deep and well drained soils and more productive than the Beekman-Vermisa Complex.

Slide areas are found around . These conditions may create management constraints especially where road construction is concerned.

Sandstone-derived and granitic soils are the only known sensitive soils within the LAU. Sandstone soiles are found on ridgetops throughout the LAU. Sandstone soils are infertile and moderately erodible. Granitic soils are found in the Snow Creek drainage.

The nutrient base of both Vermisa and Sandstone derived soils are dependent upon organic matter, therefore consumption of organic matter during broadcast burning is of some concern

There are extensive areas of rocky outcrops and talus slopes in the upper portion of the landscape.

A soil survey of Josephine County is available for detailed investigations in project planning activities. Douglas County draft soil survey information is available on blue line maps.

Soil associations are two or more soil series or soil type that occur together in a predictable pattern that are mapped as one unit but could be delineated into soil series at the current mapping scale (approx. 2 inches to the mile). Soil complexes however, are two or more soil series or types that are so intermixed that they cannot be separated into distinct soil types at the current scale of mapping.

Soil types that are considered to be sensitive to management activities such as timber harvest, road construction and broadcast burning are shallow soils (less than 20 inches deep), soils derived from granite or schist, and soils derived from serpentine or peridotite.

Shallow soils are found in complexes with deeper more developed soils but are often associated with metasediments, metavolcanics, and hard sandstone bedrock. The location of these soils is usually on ridgetops and oversteepened slopes. Sandstone derived soils tend to be nutrient deficient with low cation exchange capacities which require care to ensure the productivity is maintained. Shallow soils are vulnerable to drought conditions particularly on south and west facing slopes.

In general soil types and geology become more of a factor, affecting vegetation as the annual precipitation drops to less than 60 inches. This occurs in an easterly direction from the ocean and progressively at lower elevations.

Soils have developed from several geologic types and formations and exhibit characteristics that can be used to identify general areas of soils that behave similarly.

Soils derived from granitic geologic formations vary in texture and fertility but behave similar to schists. The organic horizon is important to the granitic soils as they have a relatively low cation exchange capacity. When disturbed by management activities granitic and schist soils are prone to extreme erosion if control measures are not taken. These soils have been highlighted in **pink** on the Douglas County Soil Survey blue line maps available in the LAU Community files.

Soils derived from ultramafic rock types (serpentine, peridotite) are known to have a mineral imbalance with a high magnesium to calcium ration. These soils are particularly unproductive in terms of commercial conifer species. Typical conifer species that may occupy these sites are Incense Cedar and Jeffery pin. Several BLM Special Status Plants are known to occur on these soil types. The Josephine and Douglas County Soil Surveys have been highlighted in **green** to indicate the location of these soils.

Soils derived from metasediment and metavolcanic rock types comprise the majority of the soils that occur in the resource area. Soil complexes that are mapped as having lithic (shallow) depths have been highlighted in **yellow** in the soil survey maps for the counties.

Soils derived from sedimentary rock types are generally fertile and productive. The exception as mentioned before is sandstone soils.

4. Watershed

The major watershed analysis parameters for the compartments within the Galesville LAU are summarized in Table . The important trigger points for these parameters in this LAU are summarized in Table .

Based on these data the following compartments appear to have some level of concern:

-Compacted area percentages are relatively high in .

-Total percentage within the transient snow zone (TSZ) is relatively high in almost all compartments since much of the unit is over 2500 feet above sea level. The exceptions are , which have little land within the TSZ.
-Openings within the TSZ are relatively high in .

-Road densities are relatively high in .

Stream densities for the compartments in the LAU are shown in Table . This unit has a relatively high stream density due to the steep, highly dissected terrain. First and second order streams comprise ____-___ % of the stream miles.

Preliminary field reviews indicate that approximately __ % of the second order streams in this unit are perennial. Approximately ___ % of the third order streams are perennial and ___ % of the fourth order streams are perennial.

Riparian condition is summarized in Table . Riparian condition is based on average tree size within the riparian zones of each stream order. Stream habitat condition (discussed in the section) is based on the riparian condition, but also includes subjective evaluations of stream bank stability, amount of disturbance, influence of roads and other sources of sediments, total sediment loads, effects of sensitive soil areas and other factors. The major factors used in this LAU include stream bank stability and roads.

Table . Watershed analysis summary for compartments in the Galesville Landscape Analysis Unit.

Compartment	BLM Acres (%)	Non-BLM Acres (%)	Total Acres	ECA Acres (%)	Compacted Area (%)	Total TSZ Acres (%)	TSZ Openings Acres (%)	Road Density (mi/mi^2)
Cow Ck. to E. Fk.								
McGinnis Ck	779 (67)	318 (29)	1,097	136 (12.4)	55 (5)	609 (65)	159 (22.4)	4.8
Negro Creek	614 (55)	502 (45)	1,116	272 (24.4)	58 (5.2)	869 (78)	339 (39)	5.6
Sugar Creek								
Meadow Ck								
Snow Creek	3511 (67)	318 (29)	5,270	658 (12.5)	161 (3.1)	3,273 (62)	468 (14.3)	3.7
Ike Butte Ck.								
Dismal Creek								
Applegate								

Compartment	BLM Acres (%)	Non-BLM Acres (%)	Total Acres	ECA Acres (%)	Compacted Area (%)	Total TSZ Acres (%)	TSZ Openings Acres (%)	Road Density (mi/mi^2)
Devil Creek								
French Creek								
Beaver Creek								
E. Fk. Cow Ck.								
Cow Ck. Above E. Fk.								
GALE. LAU TOTALS								

Shading indicates areas of management concern based on trigger values in Table 2.

Table 2. Trigger values for watershed parameters for the Rogue Frontal West LAU.

Watershed Parameter	Trigger Value
ECA percentage	20-25
Compacted Area percentage	5
Transient Snow Zone (TSZ) percentage	50
TSZ openings percentage	25
Road density (mi/mi2)	5

Trigger values are approximately those values at which management concerns begin to arise.

5. Air

There are three designated air quality areas, as defined by Oregon Department of Environmental Quality, which may affect management within the Galesville LAU.

The Kalmiopsis Wilderness has been designated a Class 1, smoke sensitive areas. This area is located approximately miles southwest of the unit. Regulations curtail burning between July 4 and Labor Day. The Wild Rogue Wilderness Area is a Class 2 smoke sensitive area and is located approximately miles to the west. Crater Lake National Park and Sky Lakes Wilderness areas are a Class * smoke sensitive area and are located approximately miles to the east.

The Grants Pass non-attainment area is miles and the Medford/Ashland non-attainment area is miles of the unit.

6. Physical features

The Galesville LAU is located within the Klamath Geomorphic Province (Dothan Formation) and is characterized by deeply weathered and eroded sandstone. The Klamath Mountains were formed from old (Mesozoic-Jurracic) geologic formations which were folded and faulted and intruded by the collision of the North American and Farallon Plates. Extensive erosion has created steep canyons with slopes averaging 50-55 percent. Ridges are oriented mostly north and south with east and west slopes. There is little variation in vegetation between the two slopes. Drainage is tributary to the Umpqua River.

The area has a Mediterranean type of climate, characterized by cool, wet winters and hot, dry summers. Annual precipitation ranges from 40 to 50 inches; summer precipitation averages about 6 inches. Summer temperatures are in the high 80s with moderate humidity and the winter temperatures can drop down to zero degrees Fahrenheit. Precipitation occurs in late fall, winter, and early spring.

7. Minerals

The upper portion LAU is in a zone identified in the RMP as having moderate potential for the accumulation of mineral resources. The area has had some mineral development in the past. The remaining area in the LAU has been identified as having low potential for the accumulation of mineral resources.
As of 2/2/93, there were placer claims and lode claims of record within the LAU.

8. Special/Unique Areas

As mentioned in the Draft RMP there are two special areas on BLM land in the watershed. Galesville Reservior located in T.31S., R.4W., Sec.'s 27, 28, 34, 35 and the surrounding View Shed from the Reservoir.
No information is yet available on USFS land.

The draft RMP has several proposed areas:
Camp site at and around Galesville Reservoir
Trail at Galesville Reservoir
Cow Creel - Snow Creek - West Fork Evans Creek Backcounty Byway

USFS campgrounds:

1.	Devils Flat Campground	T. 32 S., R. 3 W., Sec. 2
2.	Cow Creek Falls	T. 32 S., R. 3 W., Sec. 2
3.	Angel Camp	T. 32 S., R. 3 W., Sec. 35
4.	Rail Road Gap Shelter	T. 32 S., R. 2 W., Sec. 32
5.	Ricter Cabin	T. 32 S., R. 2 W., Sec. 20, sese.

This is also in the Upper Cow Creek Recreational Area. This is a joint effort among BLM (Glendale R.A. & Roseburg), USFS (Tillar), County, Oregon Department of Fish and Wildlife and private individuals

9. People (location, ownership, etc)

This unit is predominately checker board BLM ownership and solid block Umpqua National Forest. Private lands consist of numerous small holdings (Map). There is significant industrial land ownership in this unit There are numerous residences within the LAU.

The majority of the land base in this landscape is managed by the federal government with the largest portion of that under U.S. Forest Service management. The majority of the BLM's management falls to the Glendale Resource Area of the Medford District with small portions of it falling to the Butte Falls RA and Roseburg District.

Other publicly owned land in the area includes state (T.32 S., R.3 W., Sec 36), and Douglas County lands around Galesville Reservoir and rights-of-way along county maintained roads.

The remainder of the lands within the planning area are privately owned amounting to approximately 7,500 acres. Timber companies own 60-70% of that with the small landowners generally located along Cow Creek or on patented mining claims on creeks flowing into Cow Creek.

The Galesville LAU Contains approximately acres with the following owners

Bureau of Land Management	acres
U.S. Forest Service	acres
State of Oregon	acres
Roseburg Lumber Co.	acres
Western Timber Co.	acres
Superior Lumber Co.	acres
Seneca Timber Co.	acres
Medite Co.	acres
Silver Butte Timber Co.	acres
C & D Timber Co.	acres
Boise Cascade	acres
Douglas County	acres
Bull River Land Co.	acres
Other	acres

There are two encumbrances (R/W's, withdrawals, etc.) of record which pose a management concern as of 10/27/93. They are a buried fiber optic line and a communication site. The fiber optic line goes down Snow Creek road - Cow Creek road and up McGinnies Creek road.

10. Developments: Roads, quarries, impoundments and other developments.

There are approximately * miles of roads in the Galesville LAU (Map). Road densities for each compartment are displayed in Table (Watershed section). About * percent of the roads are unsurfaced. Approximately % of all roads have had transportation management objectives developed. The remaining TMOs for this analytical unit will be completed soon.

Water Sources (impoundments)

1. Galesville Reservoir T.32S, R.4W., Sec.'s 276,28,34,35
2. McGinnis Creek pump chance T.32S, R4W., Sec. 27, SWNE. Hidden by alder.
3. Sugar Creek T.32S, R.4W., Sec. 25. NW. on sugar creek road, poor condition.
4. Anchor Ranch T.32S, R.4W., Sec. 1, SESW. small
5. Anchor Ranch T.32S, R.4W., Sec. 13, SWNW. on road 23-4-12.1
6. Snow Creek T.32S, R.3W., Sec. 7, SESE

Not sure of any on USFS or private land mixed in with USFS land.

Progeny site:
Galesville - T.31S., R.4W., Sec. 22

Plus Tree Locations:
There are approximately 31 Douglas Fir plus trees and approximately 24 Sugar Pine Rust Resistant trees scattered all over the LAU. See Maps in silviculture for exact locations. Approximate locations are on maps in the LAU files.

Communication Sites:
Cedar Springs Repeater T.32S., R.4W., Sec. 25.
Fiber Optic Telephone line: Snow Creek Rd, Cow Creek Rd., McGinnis Cr. Rd.

Quarry Sites:

1. T.32S., R.4W., Sec, 11. Black Jack Quarry. This is just outside the LAU.
2. T.32S., R.4W., Sec. 2. Owned by C&D. It is now part of Galesville Reservoir.
3. T.32S., R.3W., Sec. 19. Spring Snow Quarry. Still active.
4. T.31S., R.4W., Sec. 25. McGinnis Quarry. Put to bed - reclaimed.
5. T.31S., R.4W., Sec. 25. McBug Quarry. Put to bed - reclaimed.
6. T.31S., R.4W., Sec. 27. Ump Cow Divide. Old borrow pit. No longer noticeable.
7. T.32S., R.4W., Sec. 11. Gage Station. A proposed borrow source.

This information was gotten out of the quarry book in Engineering.

Quarry Sites of USFS - obtained from map.

1. T.31S., R.3W., Sec. 26. Satan Rock pit. Is on BLM Land.
2. T.31S., R.3W., Sec. 35. Borrow pit.
3. T.31S., R.2W., Sec. 31. Quarry
4. T.32S., R.3W., Sec. 32. Gravel Pit - Skeleton Mtn.

Mine Sites:
There are numerous mine site on the USFS land. Not sure of all their locations.

11. People Activities

Social resources include special use areas, cultural sites, recreation sites and areas, and places with historic value.

Visuals

Visual resources within the area are managed differently on the two major landowners in the area, the BLM and USFS. The area immediately surrounding the Galesville Reservoir is class II on the BLM system meaning that disturbances should not be readily visible and should blend in with the surrounding area. One portion of this viewshed is managed by the Roseburg BLM and classed as VRM IV where disturbances can attract attention. We are currently working with the adjacent resources area to have these areas changed to VRM class II to insure consistency of management.

Other viewsheds managed by BLM in the area are classed as VRM III and IV lands allowing for more disturbance to be visible, the least restrictive being more distant from Upper Cow Creek County Road.

The remainder of the area is managed by the USFS, Tiller Ranger District and is subject to their management regulations. USFS VRM management is broken down into more categories than BLM based on sensitivity of viewers of a given viewshed, distance from the critical viewing area, and quality/uniqueness of the area itself. For this LAU, management is generally more restrictive as proximity of site to Upper Cow Creek Road and Cow Creek itself increase.

A map of VRM for the USFS section of this LAU is included labeled "Cow Creek Visual Quality Objectives". The following is a key to what the symbols on this map mean.

3APR - Level 3 (Lowest Sensitivity),
Variety Class A (Distinctive, landscape features are uncommon, having high visual quality),
(PR) Partial Retention (Management actions visually subordinate to characteristic landscape)

3BM - Level 3 (Lowest Sensitivity),
Variety Class B (Common in landscape),
(M) Modification (Management activities retain characteristics of surrounding area, but may dominate original landscape characteristic)

3BMM - Level 3 (Lowest Sensitivity),
Variety Class B (Common in landscape),
(MM) Maximum Modification (Vegetative and landform alterations may dominate original landscape characteristic when viewed as background, over 3-5 miles away, but even at that distance, must borrow heavily from natural form, line, color, and texture).

FG2BPR - (FG) Foreground (Areas within 1/4 to 1/2 mile of observer),
Level 2 (Moderate sensitivity),
Variety Class B (Common in landscape),
(PR) Partial Retention (Management actions visually subordinate to characteristic landscape).

MG2APR - (MG) Middleground (Areas from foreground zone to 3-5 miles from the observer),
Level 2 (Moderate sensitivity),
Variety Class A (Distinctive, landscape features are uncommon, having high visual quality),
(PR) Partial Retention (Management actions visually subordinate to characteristic landscape)

MG2BM - (MG) Middleground (Areas from foreground zone to 3-5 miles from the observer),
Level 2 (Moderate sensitivity),
Variety Class B (Common in landscape),
(M) Modification (Management activities retain characteristics of surrounding area, but may dominate original landscape characteristic)

MG2BMM - (MG) Middleground (Areas from foreground zone to 3-5 miles from the observer),
Level 2 (Moderate sensitivity),
Variety Class B (Common in landscape),
(MM) Maximum Modification (Vegetative and landform alterations may dominate original landscape characteristic when viewed as background, over 3-5 miles away, but even at that distance, must borrow heavily from natural form, line, color, and texture).

For additional information about either VRM system, see the VRM coordinator.

Recreation

Approximately 90% of the Upper Cow Creek - Galesville LAU falls within the Upper Cow Creek Recreation Area (UCCRA) established jointly with the Umpqua National Forest, ODF&W, and Douglas County Park Department. The UCCRA incorporates many recreational opportunities and developments on lands managed by the above. The area was established in an attempt ton prevent duplication of recreational facilities. The largest recreational unit in the area is the Galesville Special Recreation Management Area (SRMA) established by the Medford District RMP and encompassing several recreational development opportunities. the following list was made in conjunction with the recreation opportunities map for the LAU and describes existing and potential recreation sites within the area on all ownerships.

MEDFORD BLM (p Represents Potential Sites)
GR-27p - Galesville - Devils Flat Connecter Trail
GR-28 - Galesville Special Recreation Management Area
GR-29p - Galesville overnight site and nature trail area
GR-30p - West Evans Creek - Cow Creek National Back Country Byway
GR-31p - Galesville Reservoir Overlook

UMPQUA NF
NF-1 - Snow Creek Dispersed Recreation Site
NF-2p - Upper Cow Creek Overlook
NF-3 - Devil's Flat Campground
NF-4 - Red Mountain Trail
NF-5 - Cow Creek Gorge Special Interest Area
NF-6 - Cow Creek Trail
NF-7 - South Fork Cow Creek Unroaded Recreation Management Area
NF-8p - Northern Connector (True Name unclear)
NF-9p - White Cow Trail
NF-10 - Railroad Gap Shelter
NF-11p- Devil's Flat Trail - Green Butte Section

DOUGLAS COUNTY PARK DEPT.
DC-1 - Chief Miwaleta County Park

ODF&W
F&W-1 - Galesville Reservoir Wildlife Area
(Non-Motorized boating area)

Many of the sites above are proposed for development through the UCCRA plan but may undergo substantial changes or elimination through UCCRA plan development.

The majority of the recreation developments planned are of a semi-primitive non-motorized nature consistent with the overall nature of the area. The motorized developments currently proposed are located on existing roads and would require no new road construction or improvements.

The following profile of existing recreational users was created to aid in the development of the UCCRA plan proposals for recreation to meet existing and future anticipated use of the area.

A Generalization of the Upper Cow Creek Recreation User Profile

The majority of the use in the upper Cow Creek area takes place around Galesville Reservoir. The primary user in the summer is engaged in a water-based activity such as water skiing, swimming or fishing. Throughout the remainder of the year, fishing, both from a boat and shore, is the primary activity in the area. Other activities observed in the area are sightseeing/pleasure driving, picnicking, camping, hiking, and horse back riding with the later two occurring mostly around the Devil's Flat area. Sightseeing/pleasure driving and picnicking as a primary use of the area seem to be fairly low.

Recreational users of the area are usually older, adult males in the area alone or in groups of two to four. On the weekends and during the summer months, family groups of 2-5 appear to outnumber the other users. Large gatherings, of 15 to 40 people are fairly common in the day use area of Chief Miwaleta park.

Observations by the Forest Service From mid-April of 1990 to October of the same year show that 40% of the visitors to Galesville are from Glendale and areas south to Grants Pass, 50% from Canyonville, Myrtle Creek, and Roseburg, and the remaining 10% from outside the area (more than 1 hours drive). Observation by BLM staff from June of 1993 to October of the same year show that these statistics are still basically valid though "out of the area users" seem to be more frequent than previously reported and come from as far away as Bandon and Cave Junction on a somewhat regular basis.

Other developed sites in the area include Devil's Flat Campground and several trails in that generally vicinity. An estimate of the use these trails receive is not available at this time though it is believed that the majority of the use is by local hikers and horse back riders as well as down-hill mountain bikers. As observed in 1993, at least 50% of the people using Devils Flat Campground are there because of the lack of facilities at Galesville Reservoir. Of these visitors using Galesville and staying at Devil's Flat, at least 50% were from outside of the area and many were repeat users.

Galesville Reservoir

In the fall of 1984, the first clear cutting operations began for the Douglas County Galesville project. Water filled mostly farmlands in Township 31 South, Range 4 West, sections 27, 28, 34 and 35. The use of the accompanying lake began to affect the visual and recreation management of the adjacent Public Lands; presently a comprehensive multi-agency recreation management plan is being prepared for the south half of Township 31 south, Range 4 West; the northeast quarter of Township 32 South, Range 4 West; and almost the entire township of 32 South, Range 3 West, under the preferred alternative of the draft RMP. Timber harvest practices would be limited to partial cutting, single tree selection and small patch cuts in the Galesville Reservoir area.

12. Natural Disturbances and successional patterns

The major natural disturbance in the LAU is fire. Wind and floods have had some affect in past years.

FIRE

It is apparent that at both lower and upper elevations within the upper Cow Creek watershed fire has been a major player in development of the forests. Relatively recent burns occurred in 1987. Throughout the basin ceonothus and manzanita are abundant as well as stands of knobcone pine. Fire recurrence intervals of 50 to 100 years are thought to be common. Recreational and timber harvest use have increased the potential for more frequent fire recurrence particularly closer to the high use areas. This could have impacts on the distribution of seral stages and associated ecology of the basin.

Need map of lighting strikes

Need map of fire starts

Need characteristics of pre-settlement fires (size, patchiness)

FLOODS

Major flood events on Cow Creek occurred in 1955, 64 and 74. Little damage or degradation can currently be observed in the riparian areas. Streams with the highest potential for channel altering effects are Snow and Meadow creeks primarily due to past harvesting practices and roading. These subbasins have granitic soils throughout and adjacent to the streams. Galesville Reservoir would now control major floods down stream for the dam.

WIND

Major wind storms are rare, but do occur. In 1962 on Columbus Day the Pacific Northwest received such and event with winds in excess of 90 mile per hour. In some cases entire stands could be blown over mainly near upslopes and ridge tops. Most often single tree damage or loss is associated with winds in combination with heavy snow or saturated ground conditions. These tend to be dispersed and help to create small openings in the canopy. Thunderstorms are probably responsible for most damage. Strong updrafts and downdrafts have the potential for uprooting trees and causing limb damage.

Need to characterize wind as disturbance factor for the LAU.

EARTHFLOWS

Earthflows, including translational and rotational slides occur infrequently but are present within the LAU. Contact zones between geologic types are known to be unstable particularly when associated with serpentine. Volcanic ash deposits are inherently unstable particularly when disturbed by roading and timber harvest. Sliding can be accelerated in shallow soiled steep (>60%) areas when root strength of vegetation is disrupted by scarification and harvest. This is particularly true in sedimentary rock types associated with sandstone. Earthflow deposits often support stands of fast growing and larger trees than the surroundings area as a result of increased soil depth. This is dependant, however on soils type and stability of the site. Serpentine influence have a dramatic effect on species presence and growth.

Successional patterns:

-from major disturbance - resprouting shrubs, not much grass/forb stage. Importance of seed source ? etc.

-Rapid development of conifer pole stand; variability of higher elevation, high sites compared with lower elevation, low sites.

-mature seral stage - again, variability

-Characteristics of development of old growth habitat conditions - begins at 100 years near , maybe over 200 years old

-Discussion of successional patterns of rock outcrops, meadows, etc.??

NEED MORE INFORMATION ON THE ABOVE.

GALESVILLE LAU
LANDSCAPE ELEMENT RELATIONSHIP MATRIX

	LANDSCAPE ELEMENTS																			
LANDSCAPE ELEMENTS	PLANT COMMUN$_1$	HABITAT TYPE$_1$	PATCH SIZE$_1$	CORRIDORS$_1$	SERAL STAGE$_1$	SS PLANTS$_1$	SS ANIMALS$_2$	PROGENY SITE$_1$	NOXIOUS WEEDS$_1$	ANIMALS$_2$	SOIL TYPE	GEOLOGY$_3$	ECA 4	COMPACTION 4	ROAD DENSITY$_4$	PHYSICAL ATTR 3	MINERALS	OWNERSHIP	IMPOUNDMENTS$_5$	QUARRIES$_5$	PEOPLE
PLANT COMMUNITY[1]	X	X	X	X	X	X	X		X	X				X							X
HABITAT TYPE[1]	X	X		X	X	X	X		X	X			X	X							X
PATCH SIZE[1]	X	X	X	X		X	X		X	X			X						X		X
CORRIDORS[1]	X	X	X	X	X	X	X		X	X			X	X	X						X
SERAL STAGE[1]	X	X	X	X	X	X	X		X	X			X	X							X
S.S. PLANTS[1]	X	X		X	X	X														X	X
S.S. ANIMALS[2]		X	X	X	X		X			X			X		X				X	X	X
PROGENY SITES[1]	X	X		X	X	X		X	X	X			X								X
NOXIOUS WEEDS[1]	X	X		X	X	X			X												X
ANIMALS[2]	X					X	X			X				X							X
SOIL TYPE	X	X				X			X		X			X	X	X	X				X
GEOLOGY[3]	X	X				X			X		X	X				X	X			X	X
ECA[4]	X	X	X	X	X	X	X		X	X			X	X	X	X					X
COMPACTION[4]	X	X									X			X		X					X
ROAD DENSITY[4]		X		X		X	X		X		X		X	X	X	X					X
PHYSICAL ATTRIB.[3]	X	X		X					X	X	X					X			X		X
MINERALS	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
OWNERSHIP	X	X	X	X	X	X	X		X	X			X	X	X	X	X	X	X		X
IMPOUNDMENTS[5]	X	X	X	X	X	X	X		X	X	X		X					X	X		X
QUARRIES[5]	X	X	X	X	X	X	X		X	X	X		X		X	X	X	X		X	X
PEOPLE	X	X	X	X	X	X	X	X	X	X			X	X	X		X	X	X	X	X

1 - Vegetation landscape element divided up into these components for this chart
2 - Animal/fish landscape element divided up into these components
3 - Physical feature landscape element divided up into these components
4 - Watershed landscape element divided up into these components
5 - Development landscape element divided up into these components

Presented in this matrix are the components of the landscape elements that were considered important. The premise of "if/then" was used to determine whether or not there was a relationship between the various components, ie. if there is a change to the patch size then is there a change o affect on animals.

B. Flows

"Flows" are defined as phenomena which move across or through landscapes, whether in the air, over land or in the soil (USDA, 1992). Those which are considered as highly important in the Upper Cow Creek Landscape are addressed here. In each of the questions listed below, the following flows are considered in this section: (1) Air (2) People (3) Rain (4) Streams (5) Smoke (6) Fire (7) Animals and (8) Birds.

There are approximately 1,098 species of plants and animals which are associated to some degree with older forests (FEMAT 1993). The mobility and movement patterns vary tremendously within this group of species. Spotted owls and goshawks have very large home ranges, are very mobile and can easily cross non-suitable habitat to locate islands of suitable habitat. Other species, such as some amphibians, non-vertebrates and even plant and fungus species have extremely small home ranges, may face substantial barriers to movement across non-suitable habitat.

The factors affecting movement of these species can be generalized across the landscape, however, even if they cannot be readily mapped. Some of the factors affecting movement of these species include: inherent movement rates of the individual species, size of habitat blocks, distance between blocks, quality of habitat within the blocks and degree to which the land between blocks impedes movement (sometimes referred to as porosity).

(1) In the future what flow phenomena will be critical in the Galesville Landscape Analysis Unit?

Air This flow will always be a critical part of the watershed in providing oxygen to life forms, regulating temperatures, and contributing to the weather patterns in the area.

People This flow is also important to this watershed. The movements of people in and out of this area, and their activities strongly affect the environment and the ecosystem in many ways.

Rain Rain (or precipitation) has always been and will continue to be a critical factor in this Landscape Analysis Unit. This flow provides for vegetation growth and survival, recreation and consumption by people, and necessary use by birds, animals and fish populations.

Streams Streams are important as they are able to channel the precipitation and provide a source of habitat for a number of aquatic species. They also bring precipitation to large water bodies, such as the Galesville Reservoir, allowing for animal and people use.

Smoke In the past, smoke (or general pollution) has been an important factor, influenced mainly by timber harvest practices and naturally occurring fires. Pollution from automobiles has not been as prevalent, but may be more so with increased recreation in future years. Smoke from slash burning on Federal land will probably be significantly reduced, due to less timber volume being harvested annually. However, on private timber lands, slash burning will most likely continue and contribute to its importance in the watershed.

Fire Fire will continue to be a critical factor in the landscape unit, mostly from naturally occurring fires and from slash burning from private land owners. Fire will greatly impact forest seral stages, meadows and other types of habitat present in the area.

Animals Animals (including fish) continue to be a critical factor in the landscape, contributing to much of the attractions of recreation by people, such as hunting and fishing. Animals require resources from the landscape area for food sources, hiding cover, and other habitat requirements.

Birds Birds serve as critical to the landscape area in terms of their relationships to the forested and non-forested environments, their contributions to recreatior by people (hunting, birdwatching) and in many other ways.

(2) Which flow phenomena are most likely to be affected by human activities?

Air Air will be influenced by human activities such as slash burning, fire suppression and automobile pollution.

People Activities which are carried out by people often greatly influence other people (eg, slash burning, timber harvest).

Rain Rain is affected by human activities, principally in the ways in which it is stored in streams or reservoirs, consumed and released.

Streams Streams are affected by human activities such as recreation, mining, and other influences, which may have considerable impact on these waterways.

Smoke Smoke is influenced by human activities such as slash burning, which creates smoke and fire suppression, which attempts to reduce it.

Fire Fire is affected by human activities, by planned slash burning, or careless use of campfires. It is also influenced by suppression techniques, which can reduce the amount of fire in the landscape.

Animals Animals (including fish) are directly influenced by many people activities, such as hunting, fishing, boating, camping, mining, and road construction. The building of houses, or farming and fencing lands has continuous impacts on animal species. Timber harvest in the past has had a tremendous impact on animals, and will continue in the future.

Birds Birds are influenced by human activities similar to animals.

The next part of this writeup describes in spatial terms how the landscape flows are occurring.

(3) Where in the landscape does this particular flow occur?

Air This flow occurs everywhere above ground, and perhaps in some cases below the ground.

People People occur throughout the landscape analysis unit, including local residents living in the area as well as tourists or workers from various agencies. They may occur in the low elevation farmlands up to the highest mountain peaks. The flow of people occur on the roads and to some small extent on Galesville Reservoir.

Rain Rain (or precipitation) occurs throughout the landscape as weather patterns bring in storms. It then accumulates on the ground and flows to streams, underground reservoirs, or it may evaporate into the air.

Streams Streams collect in draws and follow gravity to other streams and the reservoir in this landscape unit. Some streams may be underground.

Smoke Smoke occurs wherever fires are present in the landscape. Potentially this could be almost anywhere in the landscape analysis unit.

Fire Fire potentially can occur almost anywhere in the watershed, such as drought stricken forest stands, campfire areas where people are careless, and in other instances.

Animals Animals (including fish) occur in many parts of the landscape, depending on habitat and food requirements. For the most part, they tend to stay away from human habitations and some will only live far away from human presence.

Birds Birds depend on certain food and habitat requirements like animals, and like neo-tropical migrants, may enter and leave the landscape each year. Where habitat is removed (such as timber stands) some are forced to find other habitats to live.

(4) Is the flow dependent on a particular landscape element (matrix, corridor or network)?

Air Air is not dependent on a landscape element.

People The flow of people depends on things such as attractants (nice weather, beautiful landscapes, recreation opportunities, fresh air, etc.) both for tourists and local landowners.

Rain Although influenced by topography and wind currents, rain is not considered to be dependent on a particular landscape element.

Streams Streams are dependent on corridors, topography, etc. in order to gather, store or disperse the waters.

Smoke Smoke is dependent on fire, wind and air.

Fire Fire is dependent on air, fuel, heat and ignition source.

Animals The flow of animals is dependent on several landscape elements, which contribute toward meeting the needs of the particular species. The availability of rain, for example may influence fish spawning activities in a given year.

Birds Birds depend on landscape elements like animals.

(5) What is the direction of the flow?

Air This flow occurs everywhere in the landscape analysis unit.

People This flow is directed toward a variety of things. For tourists, the flow is toward recreational and scenic areas. Local homeowners' flow is also toward this but also toward areas which may provide for their needs--farmlands, for example.

Rain Rain flows with gravity, both in and out of the landscape unit.

Streams Streams are also directed with gravity, but with the construction of dams such as Galesville Reservoir, streams can be diverted or converted to lakes which act as water reservoirs.

Smoke Smoke direction depends on weather patterns, fire intensity, and other factors but can be in any direction.

Fire Fire flows follow fuel sources, and can be directed by wind patterns and other weather systems, such as lightning. .

Animals The direction of animal flows can vary constantly, but will be strongly influenced by sources of food and other habitat requirements. As these factors change, so will the flow of animals. The flow can be adversely affected by man's activities (road building, timber harvest, etc.) which can place stresses on animals, forcing them to move in unsuitable areas.

Birds This flow is directed by that listed for animals, but also (for neo-tropical migrants) the flow is directed outside of the landscape analysis unit at different times of the year.

(6) What is the timing? Is it seasonal?

Air Timing for air is not seasonal. It occurs constantly.

People The flow of people is not seasonal for local residents who stay in the area year-round. It is, however, seasonal for tourists and recreationalists who visit the area during different times of the year for fishing, boating, hunting, etc.

Rain Precipitation occurs on a seasonal basis in this landscape unit, mostly during the winter and spring seasons. At times rain will fall in the other seasons as well.

Streams Headwater streams are seasonal (after rainy periods) but the majority of streams are not seasonal.

Smoke Smoke is not necessarily dependent on seasons, for fires may occur almost anytime throughout the year. However, it is often dependent on storm systems (lightning, for example) and slash burning activities in the spring and fall.

Fire Fire is generally dependent on certain conditions, which are often present in late spring, summer and early fall. To a certain extent, this is seasonal.

Animals Animals are closely associated with different seasons, for reproduction, migration, food collection and other purposes. Timing is very important for many animal species.

Birds Timing is important for various bird species as well, such as neo-tropical migrants, which winter in South America and will nest in North America in spring and summer. There are a number of these species in this landscape unit.

GALESVILLE LAU
FLOW MATRIX

	AIR	STREAMS	RAIN	SMOKE	FIRE	ANIMALS	BIRDS	PEOPLE
AIR	X		X	X	X		X	X
STREAMS		X				X	X	X
RAIN		X	X	X	X	X	X	X
SMOKE	X			X		X	X	X
FIRE	X	X		X	X	X	X	X
ANIMALS		X				X	X	X
BIRDS						X	X	X
PEOPLE	X	X	X	X	X	X	X	X

Presented in this martrix are the flows that were considered important within the Galesville LAU. The premise of "if/then" was used to determine whether or not there was a relationship between the various flows.

C. Relationships between landscape elements components and flows

The functional relationships between the five major flows and the components of the landscape elements that were considered important are discussed below. Similar components of the landscape elements are grouped together.

PLANT COMMUNITY, HABITAT TYPE, PATCH SIZE, and SERAL STAGE

These components have a relation to the following flows: air, streams, rain, fire, animals, and people.

Air: The vegetation in local areas can have an effect on the direction, speed and strength of the local air flow. The arrangement of plant community and habitat types can channel the flow of air and create frost pockets and help stunt or slow vegetation growth. Air will also help with seed dispersal and establishment of seral changes. Strong air flow can cause changes to plant communities and habitat type (wind throw). Also the plant communities and habitat types help in the quality of the air by filtering the air and by producing oxygen and using of carbon dioxide.

Streams & rain (water): Streams transport water-borne disease and seeds. Streams and water help provide nutrients for plant growth. It has and affect on the distribution and types of plants both along the length of the stream and up slope. The lack of/or presence of streams and water can affect the health of plant communities and habitat types and the advance of seral stages by supplying water and nutrients. Plant communities and habitat type have effect on snowpack retention in high elevations (TSZ) by the amount of openings that are present. They also mitigate rain-on-snow events on mid-elevations. Also the age of the plant communities and habitat type has an affect on snowpack. The younger age lack snowpack retention capability and lead to earlier and faster snowmelt. Wetland areas are important for water storage, filtering of water, slows runoff helps keep water in the aquifer. Stream side vegetation helps to keep the water temperature low and supplies nutrients to the water for aquatic plant and animal life. Plants also helps stabilize stream banks and to prevent erosion for floods and slows runoff.

Fire and smoke: Fire can destroy and/or change plant communities, habitat types, patch size and seral stage on both a large and small scale. Some plant species are dependent upon fire for their survival. Fire can change the mosaic of plant communities, habitat types, patch size and seral stage and create early seral stages. Fire can assist in nutrient cycling or can sterilize an area from plant growth for a while. In areas where there is poor forest health (out break of insect/disease) fire can reduce or eliminate the insect/disease and overall improve the health of the forest. Fire can influence the nature and type of plant communities, associations, habitat types, patch size and seral stage Plant communities, habitat types, patch size and seral stage have various affects on fire. Fire will move at different speed and direction depending upon plant communities, habitat type, patch size and seral stage. This is relative to fuel type, loading, continuity of fuel, fuel moisture and the micro-climate that the plant communities and habitat type have developed.

Animals (insects, aquatic, terrestrial, aerial): Insect activity, in part, is dependent upon the health and condition of the plant communities, habitat type, patch size and seral stage. Usually the healthier the communities, habitat, patch size and seral stage the lower the problem and flow of insects. There are times when an influx of insects will lower the health and conditions of the communities, habitats, patch size and seral stage. On a large enough scale they could change the plant communities, habitat type, patch size and seral stage Insects are always present in the communities, habitat types, patches and seral stages. Plant communities, habitat types, patches and seral stages furnish the various requires that insects need to survive.

The presence or lack of aquatic animals are an indicator of forest health Plant communities, habitat type, patch size and seral stage partially influence the local distribution and abundance of aquatic animals by their quality, location, food availability that they provide, and the control of water temperature, amount of flow and quality.

Plant communitles, habitat types, patch size and seral stages supply most of the need of aerial animals. The type, location and condition of plant communities, habitat types, patch size and seral stage influence the type of birds, etc , migration routes, nesting sites, cover, and feeding areas and amount of food supply. The birds, etc. can assist with the dispersal of seed and disease

The type of terrestrial animals present is dependent upon the type, location, and condition of plant communities, habitat type, patch size and seral stage. They supply the needs of the terrestrial animals. This includes cover from prey animals, thermal cover, forage, bedding grounds, nesting material and sites, birthing grounds, and corridors for migration. Animals can affect these landscape elements. This is done by spreading of seed and disease, over grazing, trampling, or other injure to plants.

People: Plant communities, habitat types, patch size and seral stage supply most of the needs of people. Also people can control the type, amount, and condition of these landscape elements. These elements provide recreation opportunities (hiking, fishing, hunting, berry/mushroom picking, visually pleasing vistas, and viewing opportunities for animals, and plants). They provide economic dividends to society (commercial timber, berries, mushrooms, trees, boughs, etc., hunting animals, food, recreation). They also provide a place and material for people to live and to work. They also provide renewable and non-renewable resources. People can change the use provided due to changing values (financial, social, political, educational). They can change to look and type of these elements clearing/or establishing the vegetation by various methods.

CORRIDORS

This component has a relation with the following flows: air, streams, smoke, fire, animal, and people.

Air: Air flow can be channeled through corridors (roads, streams, clearcuts). Changing these corridors will change the flow of air on a local level. Certain types of corridors can cool the air or even increase its temperature.

Streams and Rain: Once the rain has reached the ground it can be transported out the area by corridors (streams, ditch lines, overland flow). In some cases water is brought into the area by ditch lines (corridor). Water is transported out of the area by corridors. Certain corridors can lead to soil instability washouts and increase in sedimentation of the streams. Others can lead to protection and improvements of streambanks and streams, a source of large woody material, runoff retention, and nutrient supply.

Fire and Smoke: Under certain conditions smoke will follow corridors. Smoke can flow either up stream or down stream depending upon the time of day, local air flow, and if a temperature inversion exist. Roads, streams and other corridors can act a barriers to fire or to slow it spread down. Fire can create corridors through the landscape by changing the vegetative patterns (plant communities, habitat type, patch size, seral stage).

Animals: Corridors can provide travel routes and also increase the amount of harassment that occurs. Corridors provide an important component to the survival of many animal species. Not only providing a travel route it can supply cover, forage, habitat, water, food, and a means of escape from danger. They also provided a means of dispersal for insects and disease.

People: Corridors provide travel routes and access into and out of the area. This access to the area allows people to influence and affect all the landscape elements and flows either in a positive or negative way. It enables people to accomplish various goals and objectives. Corridors provide access to recreation opportunities and enhances dispersed recreation by providing access to un-road areas. They also provide a means of transport for the various commodities that society demands both for use and for biodiversity.

SPECIAL STATUS PLANTS AND NOXIOUS WEEDS

These comonents have a relation with the following flows: air, streams, fire, animals, and people.

Air: Air, in the form of wind, can transport the seed to these plants to aid in their dispersal.

Streams (water): Streams can transport the seed to other sites and out of the area leading to a spreading of the species. Water also supplies the nutrient that the plants need for growth. It also provides the right habitat. Streams can create the right conditions for the establishment of the plants (ground disturbance).

Fire: Fire can destroy the plants and/or provide the right conditions for the establishment of plants by creating a seed bed, providing nutrients, nutrien cycling and reducing or eliminating competing vegetation.

Animals: Animals can feed of these plants. Also certain of them can out compete the desired plants and eliminate the forage for animals Some plants wit move into areas that animals have disturbed. Animals can help in the dispersal of the seed.

People: Society places different values on these plants. The S.S. plants are highly valued by society. They do not want them destroyed and would like to see them increase in numbers. People can destroy the plants and also create the right growing conditions. Noxious Weeds are not highly valued In most cases people would like to eliminate them. Also people are one of the main causes of them spreading.

PROGENY SITES

This component has a relation with the following flows: air, fire, animal, and people.

Air: Due to the progeny site being younger and smaller in size than the surrounding vegetation there could be a frost pocket in the area Also wind could bring in seed of unwanted vegetation.

Fire: Fire was used to create the site conditions for the site. It was used to remove the slash and to reduce the competing vegetation Fire in its natural form could destroy all or part of the plantation. The plantation could act as a fuel/fire break.

Animal: The fence around the site acts as a barrier to animal movement through the area. If animals get inside the area they could destroy the test trees In advance stage of the site, once the fence is removed, it would provide cover, shelter, and habitat for various species of animals.

People: The site was developed due to societies need or desire to study, test and develop a strain of seed that has superior qualities There has been a lo of time, work, and money invested in the site. There has been a high value put on it to protect from being ruined.

ANIMALS AND SPECIAL STATUS ANIMALS

These two components have a relation with the following flows: Air, streams (water), fire, animals, and people.

Air: Air temperature can influence the movement of animals. Also the animals need the air (oxygen) inorder to survive.

Streams: Streams (water) provide the habitat needs for aquatic animals. The movement of aquatic animals is dependent upon stream and water flow, water quality, behavior, and physiology. Structures or lack of structures in the stream can stop, interrupt or enhance the flow of aquatic animals. The quantity of the stream flow can change the characteristics of the aquatic habitat. Streams and the associated vegetation can provide a corridor for movement and habitat of larger animals. The streams and riparian areas provide part of the food chain for animals.

Fire: Fire can displace highly mobile animals, forces them to seek refuge, and can kill them. Fire can modify the animals habitat. It can increase the quality, quantity and area of forage. It can decrease or destroy the quality and quantity of thermal cover, hiding cover, nesting areas, bedding areas, forage areas, calving areas. It can change the migration routes.

Animals: Animals can have an prey - predator, symbiotic, and/or parasitism relations. Animals can compete for needed requirements of the ecosystem and force some into new home ranges. Some animals are used by humans in the hunting of other animals.

People: People have the most affect on animals. They can eliminate animals, their habitat and food source. They use them for food and for recreation. Humans can restrict the movements of animals by building roads, buildings, fences, and dams. Humans put a high value of preserving, protecting, and harvesting of animals. Some times these values are in conflict with each other.

SOIL TYPE, GEOLOGY and MINERALS

These components have a relation with the following flows: streams, fire, animals and people.

Streams: Soil type and geology helped determine the location and characteristics of streams and channels. During storm events, streams can erode the soil and rocks. Streams can expose minerals and carry them to different locations.

Fire: Fire can sterilize the soil or help with nutrient cycling in the soil. Soil characteristics help determine the type of fire intensity desired for certain management burns. Fire can expose the type of soil, geology, and minerals present in a area. It can also help lead to erosion of soil by removing vegetation. Certain geological features can be barriers to or assist in the spread of fire.

Animals: Soil type can have an affect on the type and amount of burrowing animals, and soil organism present. By influencing the type of vegetation present, soil and geology can influence the present of other animals. Certain geological features can provide the necessary habitat for other animals (bats in caves). The physical arrangements of soil type and geological features can influence the movement of animals. The type and amount of minerals present in the soil can influence the type of habitat present for animals.

People: People can cause the soil to erode away. By mining and development of quarries people can change the geology of an area. Humans have put a high value on some minerals that are actively sought after. The type of soil and geology present can lead to humans farming, ranching, and living on the ground.

ECA

This component has relations with the following flows: streams, fire, animals and people.

Streams: As equivalent clearcut acres increase the amount of stream flow increases. Another result is that erosion and sedimentation has a direction relation with the amount of ECA.

Fire: A change in ECA can affect fire frequency, intensity, rate of spread, and size. ECA can act as a barrier to fire. Fire can change the amount of ECA by clearing off of all the vegetation.

Animals: A change in the conditions of the ECA can change the use of the area by animals and the type of animals.

People: People put a value/concern on the amount of ECA in a drainage and watershed. There is a threshold amount that is desired not to go over. The amount of ECA is related to people's desire to have certain conditions exist in the landscape, to try and keep as much biodiversity present as possible.

COMPACTION

This component has a relation with the following flows: streams, animals, people.

Streams: Stream flow and sedimentation increases when there is an increase in compaction in the landscape. This is due in part to reducing the amount of vegetation, reducing the porosity of the soil and reducing the infiltration rate of the soil.

Animals: Movement of large animals, large amount of animals and confinement of animals and lead to compaction in certain areas. Compaction of areas can lead to elimination of animals (burrowing) and create travel areas. Compaction can modify the habitat and how animals use it.

People: People are the main cause of compaction. Most of the compaction of an area comes from mans management of / interaction with the landscape. People also have the desire to reduce and/or eliminate compaction on the landscape.

ROAD DENSITY

This component has a relation with the following flows: air, streams, fire, animals, people.

Air: As road density increase, vehicle use in the area increases. With this increase in vehicle use there is an increase in air pollution of the area. Also the road system can channel the flow of air on a local scale.

Streams: Increase in road density increases the amount of sedimentation. Roads also can intercept and interrupt subsurface flows. Roads can channel surface runoff from one minor stream to another stream. Roads can change the characteristics of streams. They increase access to the streams by people. Streams in high flows can wash out roads and cause major erosion and sedimentation.

Fire: Increase in road density can lead to an increase in fire frequency of an area due to increase use by people. Road density also leads to easy access to the area for fire suppression activities.

Animals: Increase in road density can lead to an increase in animal harassment, poaching and harvesting due to increase of people use and ease of access. Animals can use the road system for easy travel routes.

People: The management goals and objectives of the landscape determine the amount of roads in the landscape. They can increase the density and also reduce the density. Man has determined that there is a threshold of 4 of miles of roads per square mile that should not be exceed for wildlife consideration.

PHYSICAL ATTRIBUTES

This component has a relation with all of the flows that were identified: Air, streams & rain, fire & smoke, animals, and people.

Air: The physical attributes of the landscape can channel the air flow upslope, downslope or across the slope, both on a large scale and on a local scale. On a small localize scale, the physical characteristics and air can create frost pockets.

Streams & Rain (water): The physical characteristics of the landscape were partly created by water runoff over centuries. Also the characteristics of the landscape and the type of geology helped determine the location of the valley bottoms and ridge tops. Transient Snow Zone (TSZ) openings provide snow accumulation storage areas. A rain-on-snow event increases the rate and amount of runoff. This is correlated to the TSZ percentage and TSZ openings percentage in the landscape. Increase in overland flow of water can increase the sedimentation of streams.

Fire & smoke: Fire and smoke can be channeled by the physical attributes of the landscape. At certain times of the year, inversion occur which keep the smoke in the landscape and from dispersing.

Animals: The physical attributes of the landscape help determine the flow and range of animals. It plays a part in where they will be at certain times of the day and also the seasons.

People: The physical attributes and characteristics of the landscape help draw people to the area. It helps determine where, what, and how they will recreate in the area. Also where they will flow through the area and where they will live and where and what kind of commodities they will use.

IMPOUNDMENTS & QUARRIES

These two components have a relation with the following flows: air, streams & rain, fire, animals, and people.

Air: Quarry development can increase the particulates in the air mass for a short period. Impoundments of water can raise the rH of the air in a localized area.

Streams & rain: Quarries increase the amount of runoff and overland flow of water which increases stream flow and sedimentation. Streams and rain feed water impoundments. The impoundments can control the amount of stream flow down streams from them. The impoundments can cause the sediment carried by the streams to settle out, thus improving downstream water quality.

Fire: Quarries can provide a safety area, a control point-anchoring point, staging areas and also be a barrier to fire. Impoundments provide a source of water for fire suppression activities. They also provide a barrier to fire spread and a control-anchoring point.

Animals: Quarries take some of the required habitat away from animals. They can also be an impediment to travel. They also can provide the necessary openings and edge effect that certain animals need. Impoundments provide the necessary habitat requirements for certain animals. They also provide watering areas.

People: People are the ones that determine the need and location of quarries and impoundments. Quarries supply the rock for roads and other construction projects. Water impoundments provide a water source for live stock and irrigation. Galesville Reservior provides a recreation area for boating, skiing, fishing, hiking, and wildlife viewing. There is plans to develop hiking trails and camping areas around the reservior. The reservior also provides water control for downstream people and uses.

PEOPLE & OWNERSHIP

These components have a relation with all of the flows that were identified: Air, streams & rain, fire & smoke, animals, and people. These elements have the most affect on all the flows and other elements. The affect that they have on one flow or element can affect the other flows and elements.

Air: The quality of the air is a main concern to people and society in general. They want a pollution free air mass. All though society and its needs is the main factor in air pollution. There is alot of effort put into maintaining a clear air mass.

Streams & rain: Streams provide water for recreation, irrigation, animal and human consumption, and habitat requirements. Society is demanding a clean supply of water and there is alot of effort put into achieving this goal. Ownership can have an effect on the quality of water that comes off the land, good or bad. Society is also one of the main factors in the degradation of water quality.

Fire & smoke: Fire can change the habitat that society wants on the landscape. Fire on a large enough scale can destroy man-made structures. The smoke from the fire pollutes the air mass. Some people are greatly affected by the amount of smoke in the atmosphere, and most do not like to have the ai mass polluted. Society does use fire to achieve some of its management goals and objectives. This is done in a controlled method to limit the amount of area burned, amount of fuel consumed, and the amount and duration of smoke. Fire is a natural part of the ecosystem. These is a difference of opinion of how much should be allowed. Society has put alot of time and money on the suppression and prevention of wildfires. Mans management on the land differs by ownership and this could cause a different fire frequency, intensity and hazard.

Animals: Society puts a premium on the presence of wildlife in the landscape. Both for keeping species present as an integral part of the ecosystem and fo recreation (hunting, fishing, viewing). Society also uses part of the landscape as range for horses and cattle. Societies activities in and on the landscape can affect the movement of animals, their habitat, harassment, disturbance and population. Some of these activities are increase road density, increase use of an area, increased access for hunting and/or poaching, changing of habitat, and blocking or altering their movement. The habitat management on the land is often controlled by the ownership of the land.

People: There is a conflict between the various publics on what and how the landscape should be used and what commodities should come from it. Depending upon the ownership of the land, mans management practices can differ. Societies needs and wants are what has determined the activities on th landscape and to a large degree on how the landscape and ecosystem looks and functions today. Society is the driving force behind what occurs on and tc the landscape and ecosystem.

GALESVILLE LAU
LANDSCAPE ELEMENT COMPONENT - FLOW MATRIX

LANDSCAPE ELEMENTS	FLOWS						
	AIR	STREAMS	RAIN	SMOKE	FIRE	ANIMALS	PEOPLE
PLANT COMMUNITY	X	X	X	X	X	X	X
HABITAT TYPE	X	X	X	X	X	X	X
PATCH SIZE	X	X	X	X	X	X	X
SERAL STAGE	X	X	X	X	X	X	X
CORRIDORS	X	X		X	X	X	X
S.S. PLANTS	X	X			X	X	X
NOXIOUS WEEDS	X	X			X	X	X
PROGENY SITES	X				X	X	X
S.S ANIMALS	X	X			X	X	X
ANIMALS	X	X			X	X	X
SOIL TYPE		X			X	X	X
GEOLOGY		X			X	X	X
MINERALS		X			X	X	X
ECA		X			X	X	X
COMPACTION		X				X	X
ROAD DENSITY	X	X			X	X	X
PHYSICAL ATTRIBUTES	X	X	X	X	X	X	X
QUARRIES	X	X	X		X	X	X
IMPOUNDMENTS	X	X	X		X	X	X
OWNERSHIP		?		?	X	X	X
PEOPLE	X	X	X	X	X	X	X

Presented in this matrix are the components of the landscape elements and the flows that were considered important to analyze. The premise of "if/then" was used to determine whether or not there was a relationship between the various components and flows.

GALESVILLE LAW
FLOW - LANDSCAPE ELEMENT COMPONENT MATRIX

	LANDSCAPE ELEMENTS																				
FLOWS	PLANT COMMUN	HABITAT TYPE	PATCH SIZE	SERAL STAGE	CORRIDORS	SS PLANTS	NOXIOUS	PROGENY SITE	SS ANIMALS	ANIMALS	SOIL TYPE	GEOLOGY	MINERALS	ECA	COMPACTION	ROAD DENSITY	PHYSICAL ATT	QUARRIES	IMPOUNDMENTS	OWNERSHIP	PEOPLE
AIR	X	X				X	X		X	X											X
STREAMS	X	X		?	X	X	X		X	X	X	?	X			?	X	?	X	?	X
RAIN	X	X		?	X	X	X	X	X	X	?						X		X		X
SMOKE					X				X	X											X
FIRE	X	X	X	X	X	X	X	X	X	X				X			X				X
ANIMALS	X	X	X	X	X	X	X	X	X	X				X	X				X		X
PEOPLE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Presented in this matrix are the components of the landscape elements and the flows that were considered important to analyze. The premise of "if/then" was used to determine whether or not there was a relationship between the various components and flows.

D. Pre European man settlement

***NEED WRITE ***

E. Linkages of LA unit (internal and external)

Discussion will focus on how this LAU relates to surrounding LAUs, to nearby communities, the region, etc.

F. Management Concerns.

Higher precipitation and less droughty conditions experienced in this unit make it less vulnerable to wildfire than the other portions of the Glendale Resource Area, but fire danger is still considered to be moderately high. Past and present management practices will cause increased fire intensity in the event of a wildfire. Fuel loading in some drainages is an increasing management concern. Broadcast burning is less constrained because of smoke management objectives, and in general we have been able to accomplish burning needed for site preparation. Fuel loading in individual watersheds will be a concern in future management actions.

In general reforestation success in this unit is high if needed site preparation is accomplished. Burning to reduce fuel loading and vegetative competition is often required to accomplish adequate reforestation and insure growth of planted seedlings.

The Cow Creek viewshed has visual concerns and is classed as VRM 2.

Several watersheds have existing high road densities.?????

______ of the ____ quarter townships are already below the 50-11-40 criteria for spotted owl dispersal habitat.

Approximately _____ acres within the unit have been designated as critical habitat for the northern spotted owl.

Habitat for cavity users has been severely reduced by timber harvest.

Existing ECA levels greater than 25 percent may delay harvest activity for at least 5 years. These were listed in the unit description paragraph.

Others???

IV. Landscape Goals and Objectives

Goal: Protect present late successional habitat and promote development of additional late successional habitat on lands suitable for developing such habitat.

Objective 1: Suppress all wildfires until a detailed fire management plan can be developed.

Objective 2: Create late successional characteristics in older stands where they are currently lacking (eg. create snags where they have been removed, develop multiple canopy layers, fill trees along streams where large woody debris has been removed).

Objective 3: Evaluate and treat stands under 80 years old to promote developoment of late successional habitat. Priority would be placed on stands over
years old.

Objective 4: Conduct silvicultural activities in a manner which reduces risk of large scale disturbance.

Objective 5: Restore biological and structural diversity, as much as practical, to mitigate previous monocultural actilvities.

Objective 6: Manipulate salvage to enhance late successional characteristics.

Goal: Riparian zone enhancement and maintenance

Objective 1:

Goal : Manage water resources in compliance with legal requirements to protect, maintain, or improve the quality of water resources and watershed values associated with BLM administered land, including surface and ground water quality and quantilty.

Objective 1: Stabilixe stream banks and provide for adequate buffer areas in future projects.

Objective 2: Rehabilitate stream banks or riparian areas that have been greatly impacted by past management actions.

Objective 3: Mitigate sedimentation into streams through road and logging desilng.

Objective 4: Establish an ongoing inventory and monitoring system to gather appropriate information.

Goal: The desired future condition of the unit is a high level of ecological diversity and maintenance of forest development.

Objective 1:

V. Implementation Guidelines

Management Opportunities

Will discuss opportunities for timber sales, habitat enhancement, recreational development, resource protection, etc.

This section will have management direction taken from the RMP, SEIS, as well as developed within the LA team.

Actions needed to reach Landscape Goals and Objectives

A. Short Term

Short Term objectives (0-10 Years)

1. Retain all current spotted owl habitat and all old growth habitat. Begin silvicultural techniques to speed up growth of forest stands for spotted owl habitat. This can include replanting riparian vegetation in harvested timber sale units along streams, thinning and brushing forested stands which are presently unsuitable for spotted owls.

2. Continue to monitor all owl sites to US Fish and Wildlife Service protocol in the LAU.

3. Begin to initiate land purchase or exchange projects which would block ownership in the LAU. Begin partnerships with other landowners to provide current and future owl habitat.

4. Close roads where appropriate, to minimize disturbance to owls and other wildlife species. RMP guidelines state that "roads would be managed through use of gates and other types of road barricades to limit motorized vehicle use to an open road density of 1.5 miles per square mile, where possible."

    1. Inventory and monitoring needs.

Need to further develop these recommendations, expand list, determine methods, set priorities, establish plan for accomplishing the needed work

-Stream surveys for fish habitat condition
-Inventory stream class (perennial, intermittent)
-Riparian inventory on both fish and non-fish streams
-Status of young stands and management recommendations
-Ecological conditions and characterization of older stands
-Transportation management objectives (TMOs) for all roads
-Vegetation classification (series, association)
-Inventory of special status species and associated habitats
-Inventory of special habitat features
-Vegetation and habitat inventory of Wilderness Area
-Assessment of recreational use of unit
-Set up permanent photo points
-Assess fire history (fire scars from stumps?)
-Inventory of commercial thinning opportunities
-Inventory of noxious weeds
-Inventory of special status plants and their habitats
-Water quality monitoring
-Assessment of elk numbers, movements and habitat use

-Quantitative landscape analysis of older forests
-OTHERS????

2. Other possible management actions

Projects; resource specific
Monitoring plan by resource
Potential partnerships - private land owners, USFS, state
Timber sales
Development of special forest products program
Research needs
Others???

B. Long Term Actions to meet landscape objectives

Long Term Objectives (11-80+ years)

1. Develop owl habitat--and determine how much: 100%? 80%? 50%? Throughout BLM mainly or even through the whole LAU area? How much will we work with other landowners? How much OG habitat? Are we considering these the same thing?

2. Delist the spotted owl: Help to comply with the LAU requirements which will eventually lead to helping delist the owl

3. Minimize fire hazard potential throughout the LAU--how? Salvage? What about insects? Other potential disturbances. How much can we really do? Explain what this will require and what the benefits to owls and other species would be.

4. Block ownership in the LAU boundary by land exchange or purchase. How MUCH? ALL? Some? Target some areas.

VI. Monitoring and Work months needs

Active pair sites (and potential owl habitat)

Bureau of Land Management protocol for spotted owls on the LAU would continue to be conducted in active pair sites, territorial single sites and in potentia owl areas. Refer to BLM protocol.
(2 Work months/year)

Where any salvage or silvicultural activities are implemented, close monitoring of active owl sites or owl surveys in owl habitat would be conducted or in th process of being conducted, if appropriate (ie, where spotted owl habitat does not presently exist in those areas, no surveys would be deemed necessary).
Workload 3-4 WM/Year

Other opportunities/activities to be conducted as appropriate, funding available, etc.:
1. Presence/absence studies
2. Reproductive studies
3. Radio tag studies, in salvage or special silvicultural areas
4. Prey abundance studies
5. Habitat relationships/density studies
6. Studies with other species as appropriate
Workload requirements
32+ work months/year required for the LAU
Other notes:
Break management opportunities for wildlife down into specific habitat components (ie, nesting opportunities, foraging opportunities, etc.)
Incorporate other species into management opportunities.
Landsat Map * Consider UCCRA plan * Talk to private landowners/ODFW
Objectives: Old growth wildlife species/cavity nesters/mammals
Landscape Objectives for Old Growth * Other Resource Objectives

VII. Implementation Time Line

Establish time frames, priorities, estimate budget and manpower needs, etc.

Galesville Landscape Analysis 2-23-94
List of Tables and sections of text

1 -watershed condition/by compartment - water
2 -watershed indices trigger points - water
3 -stream density - water
4 -riparian condition/by compartment - water
5 -age class dist - veg
6 -special status plants - veg
7 -special status species - wildlife
8 -spotted owl habitat
9 -spotted owl dispersal habitat
10 -fish distribution
11 -stream conditions by compartment - wildlife
12 -fish habitat condition

Other possible tables to be included in the future if needed:
-acreages of LAU, compartments - LAU description
-BLM/private ownership by compartment - LAU description
-official habitat designations - wildlife
-elk habitat indices - wildlife
-road miles, densities, etc. - roads

List of Maps, sections of text and type of map
1 -general location map of LAU - LAU description
2 -map of LAU and compartments - LAU description - GIS
3 -spotted owl habitat - wildlife - GIS
4 -spotted owl critical habitat - wildlife
5 -marbled murrelet zones - wildlife
6 -land ownership - social
7 -roads - roads - GIS
8 -major land use allocations - option 9

Other possible maps to use in the future if needed:

-veg type map - veg - GIS
-age classes - veg - GIS
-special status species locations - wildlife - GIS
-OGEAs, critical habitat, LSRs, etc. - veg, wl, etc. - GIS
-special habitats - wl - GIS
-anadromous fish dist. - wl - GIS
-soils map?? sensitive soils? - soils - GIS
-road closures, quarries, ponds, etc - roads - GIS???
-VRM classes - recreation - GIS

C. Relationships between landscape elements and flows

The functional relationships between the five major flows and the components of the landscape elements that were considered important are discussed below Similar components of the landscape elements are grouped together.

LANDSCAPE ELEMENTS	LANDSCAPE FLOWS				
	AIR	STREAMS/RAIN	SMOKE/FIRE	ANIMALS	PEOPLE
PLANT COMMUNITY, HABITAT TYPE, PATCH SIZE, SERAL STAGE	-local effect on direction, speed, strength -channel air flow -create frost pockets -stunt vegetation -seed dispersal -filtering the air -change in habitat (wind throw)	-low to high run off -increase soil movement -low to high interception -decrease soil movement -increase overland flow -transportation of seed -provides nutrients -effect snow pack -effect rain-on-snow events -water storage -filtration -water temperature -stream bank stability	-destroy or change -plant species dependent upon for survival -change mosaic -assist in nutrient cycling -control insect/disease -influence type of veg. -veg. effects fire characteristics	-insect activity dependent upon -insects effect veg. health -provide necessary habitat requirements -aquatic life indicate forest health -wildlife present and use depends upon type of veg. -helps in migration -provides cover, forage, nesting sites, bedding grounds, etc	-supply most needs -people can control quantity and quality -control type and amont of use -provide recreation -provide food -provide economic dividends -provide place to live
CORRIDORS	-channel air flow -effect air temperature	-provides movement into and out -effect on sedimentaion -effects quality of water -effect surface & sub-surface flows -effect peak flows -alter function of corridors -supply coarse woody material	-can follow corridors -act as barriers to fire -fire can create new corridors	-provide travel routes -provide important component to survival -dispersal of insects/disease	-provide travel routes -access to recreation -transport of commodities -provide biodiversity -access for management -access to influence all flows & elements
SPECIAL STATUS PLANTS NOXIOUS WEEDS	-aid in dispersal of seed	-transport of seed -supplies nutrients -provided habitat	-destroy plants -provide growth conditions -helps nutrient cycling -eleminate competition	-provide/remove forage -help in dispersal of seed -can destroy plants -provide disturbance for growth	-Society places value on -people can destroy -help in survival -create right conditions -help in dispersal of seed, etc
PROGENY SITES	-bring in unwanted seed -create frost pocket	-n/a	-used to create site -could destroy all or part -could act as a fuel/fire break	-fenced to keep animals out -change travel routes -advance stage provide habitat	-alot of investment in site -high value -people required

LANDSCAPE ELEMENTS	LANDSCAPE FLOWS				
	AIR	STREAMS/RAIN	SMOKE/FIRE	ANIMALS	PEOPLE
ANIMALS, SPECIAL STATUS ANIMALS	-Temp. influences movement -supplies oxygen	-provide habitat needs -aquatic animals depend upon -quantity & quality effect all animals -provide travel corridor	-can displace animals -can kill -can modify habitat (good/bad) -change migration routes	-prey-preditor relation -symbiotic/parastism relation -compete -used by humans in hunting	-eliminate species -eliminate/change habitat -used for food & recreation -restrict movement -put high value - both for protecting and harvesting
SOIL TYPE, GEOLOGY, MINERALS	-N/A	-determined location of streams & characteristics -erode & expose minerals, etc	-sterlize soil -help with nutrient cycling -expose soil, minerals, formations -help determine fire intensity in prescribe burns -geological features act as barriers or assist with fire spread	-affect burrowing animals -affect type of soil organisms -influence present of animals -provide habitat (bats) -influence movement -influence type of habitat	-cause erosion -extraction of rock-minerals -influence farming, living, ranching & recreation
ECA	-N/A	-affect stream flow -affect sedimentation/erosion	-affect frequency, intensity, r-o-s & size of fire -act as a barrier -change amount of ECA's	-affect use of area by animals -affect type of animals present	-desired threshold amount -related to biodiversity
COMPACTION	-N/A	-increase stream flow -increase sedimentation -reduces soil porosity -reduces infiltration rate	-N/A	-can lead to compaction -elimination of burrowing animals -create travel areas -modify habitat & use of	-main cause through management actions -desire to reduce/eliminate
ROAD DENSITY	-lead to increase pollution -channel air flow	-increase sedimentation -intercept & interrupt subsurface flow -channel runoff -increase overland flow -change characteristic -increase access to streams -wash out roads	-increase fire risk -gives access to fires -act as barrier	-increase harrssement -increase poaching -increase harvesting -provide travel routes	-management & goals determine amount -desired threshold for wildlife considerations
PHYSICAL ATTRIBUTES	-channel air flow -can create frost pockets	-created by runoff -help determine location -provide snow accum. (TSZ) -affects overland flow -affects sub-surface flow	-channel fire & smoke -act as barrier to fire	-affect flow & range -affects presence of [illegible]	-help draw people to areas -affects type of recreation -affects flow of people -affects type of commodities

	LANDSCAPE FLOWS				
LANDSCAPE ELEMENTS	AIR	STREAMS/RAIN	SMOKE/FIRE	ANIMALS	PEOPLE
IMPOUNDMENTS, QUARRIES	-increase particulates -raise rH	-increase amount of runoff -intercepts & interrupts sub-surface flows -increase sedimentation -control stream flow -settling of sediments	-provide safety area -barrier to fire -anchoring points -stageing areas -source of water for suppression	-affects amount & type of habitat -impedment to travel	-determined location -supply need resources -provide recreation areas
PEOPLE, OWNERSHIP	-value air quality	-provide areas for recreation -consumption -affect quality fo water -affect flows & use	-can change desired landscape -can destroy man-made objects -leads to pollution -use to achieve management -affect frequency, intensity fire hazard, and risk	-puts a premiun of wildlife -affects survival of -affects movement & range -affects habitat -suppley some of man's needs	-conflict between people -needs -wants -desires -driving force behind any management